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United States Air Force
Computer–aided Acquisition &
Logistics Support (CALS)

# LOGISTICS SUPPORT ANALYSIS CURRENT ENVIRONMENT

## Volume 2

91-13238
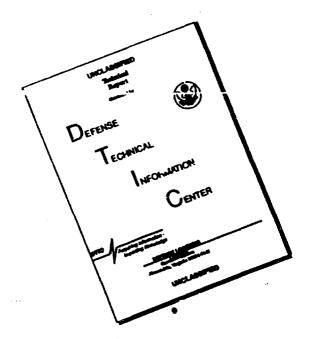
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An analysis of the cureent environment within the Acquisition stage of the Weapon System Life Cycle Pertaining to the Logistics Support Analysis (LSA) process, the Logistics Support Analysis Record (LSAR), and other Logistics Support data was undertake as part of the U.S. Air Force Computer-aided Acquisition and Logistic Support (CALS) Program. This investigation of this LSA/LSAR environment was coordinated by the CALS Management Integrateion Office (MIO) at HQ AFSC.
This volume (Volume 2) of the LSA Current Environment report consists of three appendices that describe the LSA process. In the first appendix the MIL-STD-1388-1 process is functionally decomposed using the ICAM definition $IDEF_0$ model. The second appendix uses data flow diagrams to trace the flow of support planning information. Roles and responsibilities of the various Air Force organizations involved in LSA are presented in the third appendix.

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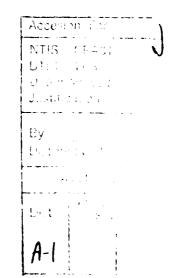| 17. SECURITY CLASSIFICATION OF REPORT | 18. SECURITY CLASSIFICATION OF THIS PAGE | 19. SECURITY CLASSIFICATION OF ABSTRACT | 20. LIMITATION OF ABSTRACT |
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# PREFACE

An analysis of the current environment within the Acquisition stage of the Weapon System Life Cycle pertaining to the Logistics Support Analysis (LSA) process, the Logistics Support Analysis Record (LSAR), and other Logistics Support data was undertaken as part of the U.S. Air Force Computer-aided Acquisition and Logistic Support (CALS) Program. This investigation of this LSA/LSAR environment was coordinated by the CALS Management Integration Office (MIO) at HQ AFSC.

This volume (Volume 2) of the LSA Current Environment report consists of three appendices that describe the LSA process. In the first appendix the MIL-STD-1388-1 process is functionally decomposed using the ICAM definition $IDEF_0$ model. The second appendix uses data flow diagrams to trace the flow of support planning information. Roles and responsibilities of the various Air Force organizations involved in LSA are presented in the third appendix.

Volume 1 of the LSA Current Environment report identifies the major LSA/LSAR issues, based on a review of several weapon system acquisition programs. These issues are based on input from both the Air Force and Contractors, and on findings resulting from the organizational assessment, the $IDEF_0$ model and data flow modeling activities contained in Volume 2 of this report.

Dr. Robert Smith of the Systems Automation Division at the Transportation Systems Center (TSC) of the Department of Transportation directed the TSC LSA team. TSC has drawn upon the knowledge and experience of a number of consultants, and would like particularly to recognize the contribution of staff members from the following organizations: Battelle Columbus Division, DYNATREND Inc., RJO Enterprises, and UNISYS Inc.

Given the complexity of the LSA process the LSA team would be grateful for any contributions that Air Force personnel and Contractors can add to the understanding of the current environment. It is with this kind of dialogue that the team can best assist the Air Force to achieve its goals of cost-effective weapon system acquisition, operation, and support.

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# VOLUME 2

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## LIST OF ACRONYMS

| | |
|---|---|
| AAC | Alaskan Air Command |
| AD | Armament Division |
| ADP | Automatic Data Processing |
| AFALC | Air Force Acquisition Logistics Center |
| AFCC | Air Force Communications Command |
| AFCMD | Air Force Contract Management Division |
| AFCOLR | Air Force Coordinating Office for Logistics Research |
| AFLC | Air Force Logistics Center |
| AFOTEC | Air Force Operational Test and Evaluation Center |
| AFR | Air Force Regulation, |
| AFSC | Air Force Systems Command |
| AGMC | Aerospace Guidance and Metrology Center |
| ALC | Air Logistics Center |
| ASD | Aircraft System Division |
| ATC | Aeronautical Systems Division |
| ATI | Automated Technical Information |
| AU | Air University |
| BCS | Baseline Comparison System |
| BIT | Built-In Test |
| BMO | Ballistic Missile Office |
| CALS | Computer-aided Acquisition and Logistic Support |
| CAMS | Comprehensive Automated Maintenance System |
| CDR | Critical Design Review |
| CDRL | Contract Data Requirements List |
| CEP | Concept Exploration Phase |
| CFP | Concept Formulation Package |
| DCN | Design Change Notice |
| DCP | Decision Coordinating Paper |
| DFD | Data Flow Diagram |
| DID | Data Item Description |
| DoD | Department of Defense |
| DoDD | Department of Defense Directive |
| DoDI | Department of Defense Instruction |
| DOT | Department of Transportation |
| DPML | Deputy Program Manager for Logistics |
| DRU | Direct Reporting Unit |
| DT | Development Testing |
| DT&E | Development, Test, and Evaluation |
| DTC | Design To Cost |

| | |
|---|---|
| D&V | Demonstration and Validation |
| ECP | Engineering Change Proposal |
| EI | End Item |
| EIR | Equipment Improvement Recommendation |
| ESC | Electronic Security Command |
| ESD | Electronic Systems Division |
| FFBD | Function Flow Block Diagram |
| FMEA | Failure Modes and Effects Analysis |
| FMECA | Failure Modes, Effects and Criticality Analysis |
| FSD | Full Scale Development |
| GFE | Government Furnished Equipment |
| GFM | Government Furnished Material |
| ICAM | Integrated Computer Aided Manufacturing |
| ICOM | Inputs, Controls, Outputs, Mechanisms |
| IDEF | Integrated Computer Aided Manufacturing Definition |
| ILS | Integrated Logistics Support |
| ILSM | Integrated Logistics Support Manager |
| ILSP | Integrated Logistics Support Plan |
| IM | Item Manager |
| IOC | Initial Operating Capability |
| IPB | Illustrated Parts Breakdown |
| IPS | Integrated Program Summary |
| ISP | Integrated Support Plan |
| ISIL | Interim Support Item List |
| JMSNS | Justification for Major System New Start |
| LCC | Life Cycle Cost |
| LCN | LSA Control Number |
| LL | Lessons Learned |
| LOA | Letter of Agreement |
| LOGPAR | Logistics Program Review |
| LSA | Logistics Support Analysis |
| LSAP | Logistics Support Analysis Plan |
| LSAR | Logistics Support Analysis Record |
| LSR | Logistics Support Resource |
| LSRF | Logistics Support Resource Funds |
| MAC | Military Airlift Command |
| MAJCOM | Major Command |
| MATE | Multi-Purpose Automatic Test Equipment |
| MIL-STD | Military Standard |
| MIO | Management Integration Office |
| MPP | Modular Planning Process |

| | |
|---|---|
| MRP | Manpower Requirements Personnel |
| MRSA | Materiel Readiness Support Activity |
| MTBF | Mean–Time–Between–Failures |
| MTTR | Mean–Time–To–Repair |
| NATO | North Atlantic Treaty Organization |
| O&O | Operational and Organizational |
| O&S | Operations And Support |
| OPR | Office of Primary Authority |
| OT | Operational Testing |
| OT&E | Operational Test and Evaluation |
| PACAF | Pacific Air Forces |
| PD | Product Data |
| PDD | Product Definition Data |
| PDR | Preliminary Design Review |
| PER | Parametric Estimating Relationship |
| PERT | Program and Evaluation Review Technique |
| PHS&T | Packaging, Handling, Storage, and Transportation |
| PM | Preventive Maintenance |
| PMD | Program Management Directive |
| PMP | Program Management Plan |
| PMRT | Program Management Responsibility Transfer |
| POL | Petroleum, Oil, Lubricant |
| PPL | Provisioning Parts List |
| PPSL | Program Parts Selection List |
| PROD | Production Phase |
| PT/LD | Physical Teardown/Logistic Demonstration |
| QPA | Quantity per Assembly |
| QQPRI | Qualitative and Quantitative Personnel Requirements |
| R&M | Reliability and Maintainability |
| RAM | Reliability, Availability, Maintainability |
| RAS | Requirements Allocation Sheets |
| RCM | Reliability Centered Maintenance |
| REMIS | Reliability and Maintainability Information System |
| RFP | Request For Proposals |
| RILSA | Resident Integrated Logistics Support Activity |
| RLA | Repair Level Analyses |
| ROC | Required Operational Capability |
| RPSTL | Repair Parts and Special Tools List |
| RTAT | Repair Turnaround Time |
| SAC | Strategic Air Command |
| SCP | System Concept Paper |

| | |
|---|---|
| SD | Space Division |
| SDR | System/Equipment Design Review |
| SEMP | System Engineering Management Plan |
| SERD | Support Equipment Recommendation Data |
| SMR | Source, Maintenance, Recoverability |
| SOA | Separate Operating Agency |
| SON | Statement of Need |
| SORD | System Operational Requirements |
| SOW | Statement of Work |
| SPACECOM | Space Command |
| SPM | System Program Manager |
| SPO | System Program Office |
| SSC | Skill Specialty Code |
| SSSN | System Subsystem Number |
| STF | Special Task Force |
| T&E | Test and Evaluation |
| TAC | Tactical Air Command |
| TEMP | Test and Evaluation Master Plan |
| TM | Technical Manual |
| TMDE | Test, Measurement, And Diagnostic Equipment |
| TOs | Technical Orders |
| TRC | Technical Repair Center |
| TSC | Transportation Systems Center |
| TTEL | Tools and Test Equipment List |
| TTS | Training and Training Support |
| UUT | Unit Under Test |
| WBS | Work Breakdown Structure |

# APPENDIX A

# MIL-STD-1388-1A : IDEF$_O$ MODEL

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# APPENDIX A
# MIL-STD-1388-1A: IDEF$_0$ MODEL

## A.1   INTRODUCTION

Logistics Support Analysis (LSA) is the selective application of scientific and engineering efforts undertaken during the weapon system's acquisition, as part of the systems engineering and design process. The objectives of the LSA process are to integrate supportability requirements into the systems engineering and design process, define the optimal support requirements, define the required operational support and resources, and develop an integrated data base of logistics-related engineering information. The LSA process is governed by MIL-STD-1388-1A and is described in Volume 1 of this report.

The existing LSA process can be analyzed in two ways. The flow of information between activities and external organizations is analyzed using data flow diagrams (see Appendix B of this volume for a description of the data flow diagrams and Appendix C for a description of the role of the external organizations). The functions the system performs and the mechanisms by which these are done are analyzed using the IDEF$_0$ model. This appendix uses the IDEF$_0$ model to analyze the existing LSA process. IDEF$_0$ methodology has been used to model a variety of systems, where a system may include any combination of hardware, software, and people. This IDEF$_0$ model decomposes LSA activities into smaller, more detailed activities through the subtask level. The appendix also contains a functional node tree preceding the IDEF$_0$ models, that hierarchically depicts the decomposition of all LSA tasks. In contrast to the IDEF$_0$ model, the node tree does not depict information flows related to the activities. The IDEF$_0$ model does not identify the major organizations involved in the LSA process and their relationships to the SPO and Contractor.

Section 2 of this appendix presents an overview of the LSA tasks through the functional node tree. Section 3 defines the IDEF$_0$ modeling technique. The Context or top-level overview of the IDEF$_0$ diagrams, identifying the major Inputs, Controls, Outputs, Mechanisms (ICOMs) of the LSA process, is presented in Section 4. Section 5 summarizes the five major LSA series tasks and their interrelationships. Sections 6, 7, 8, 9, and 10 contain a detailed description of all LSA tasks within each of the five major series. References and points of contact for all appendices in this volume follow Appendix C. A glossary of acronyms follows the Preface to this volume.

## A.2   NODE TREE DIAGRAM

The node tree diagram presented in Figure A-1 gives a hierarchical overview of the tasks necessary to perform LSA. In contrast with the IDEF$_0$ model, the node tree does not depict information flows related to the activities. Showing the activities involved in LSA
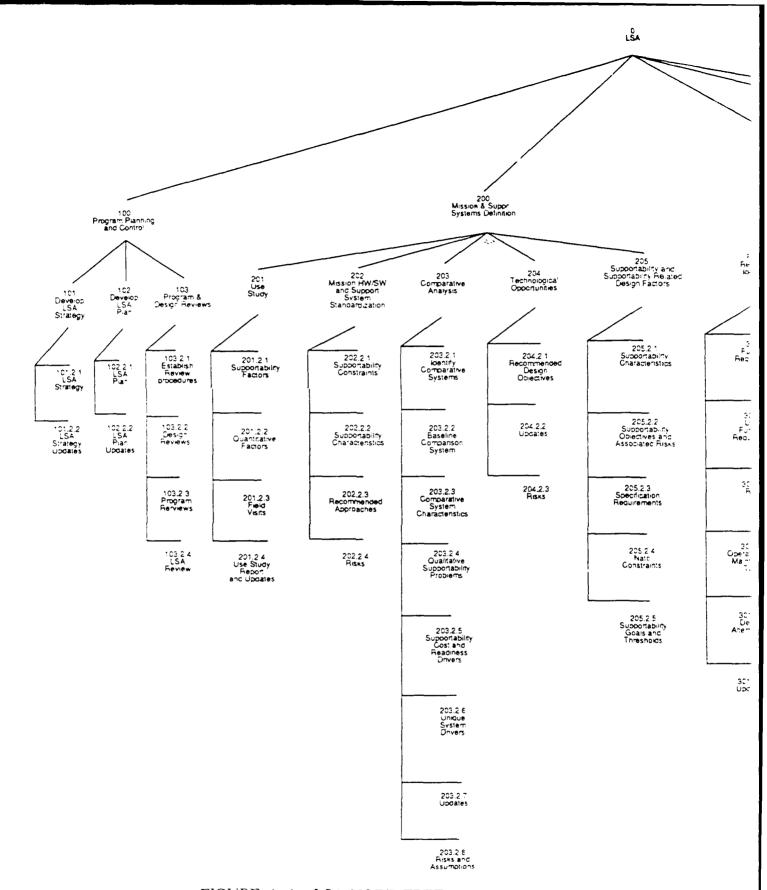
FIGURE A-1. LSA NODE TREE

0
LSA

300
Preparation and
Evaluation of Alternatives

400
Support
Resources

500
Supportability Assessment

205
Supportability and
Supportability Related
Design Factors

301
Functional
Requirements
Identification

302
Support
System
Alternatives

303
Evaluation of
Alternatives and
Tradeoff Analysis

401
Task
Analysis

402
Early
Fielding
Analysis

403
Post
Production
Support
Analysis

501
Supportability
Test,
Evaluation
and Verification

205.2.1
Supportability
Characteristics

301.2.1
Functional
Requirements

302.2.1
Alternative
Support
Concepts

303.2.1
Tradeoff
Criteria

401.2.1
Task
Analysis

402.2.1
New
System
Impact

403.2.1
Post
Production
Support
Plan

501.2.1
Test and
Evaluation
Strategy

205.2.2
Supportability
Objectives and
Associated Risks

301.2.2
Unique
Functional
Requirements

302.2.2
Support
Concept
Updates

303.2.2
Support
System
Tradeoffs

401.2.2
Analysis
Documentation

402.2.2
Sources of
Manpower
and
Personnel
Skills

501.2.2
Objectives
and
Criteria

205.2.3
Specification
Requirements

301.2.3
Risks

302.2.3
Alternative
Support
Plans

303.2.3
System
Tradeoffs

401.2.3
New/Critical
Support
Resources

402.2.3
Impact of
Resource
Shortfalls

501.2.3
Updates
and
Corrective
Actions

205.2.4
NATO
Constraints

301.2.4
Operations and
Maintenance
Tasks

302.2.4
Support
Plan
Updates

303.2.4
Readiness
Sensitivities

401.2.4
Training
Requirements
and
Recommendations

402.2.4
Combat
Resource
Requirements

501.2.4
Supportability
Assessment
Plan
(Post Deployment)

205.2.5
Supportability
Goals and
Thresholds

301.2.5
Design
Alternatives

302.2.5
Risks

303.2.5
Manpower
and
Personnel
Tradeoffs

401.2.5
Design
Improvements

402.2.5
Plans for
Problem
Resolution

501.2.5
Supportability
Assessment
(Post Deployment)

301.2.6
Updates

303.2.6
Training
Tradeoffs

401.2.6
Management
Plans

303.2.7
Repair
Level
Analysis

401.2.7
Transportability
Analysis

303.2.8
Diagnostic
Tradeoffs

401.2.8
Provisioning
Requirements

303.2.9
Comparative
Evaluations

401.2.9
Validation

303.2.10
Energy
Tradeoffs

401.2.10
ILS
Output
Products

303.2.11
Survivability
Tradeoffs

401.2.11
LSAR
Updates

303.2.12
Transportability
Tradeoffs

and their potential decomposition relationships provides a reference point for understanding the process represented in the IDEF$_0$ diagrams.

As described in MIL-STD-1388-1A, LSA is a planned series of tasks performed to examine all elements of a proposed system to determine the logistic support required to keep the system usable for its intended purpose; and to influence the design so that both the system and support can be provided at an affordable cost. The numbering scheme in the MIL standard breaks down the tasks required to analyze and synthesize the logistic support requirement into the five major sections. These major sections, or task series. are numbered 100 through 500. The first decomposition of the section is 01, 02... (for example 101). The next decomposition is always .2. The last decomposition is 1, 2... and refers to the subtask. Given this criteria for numbering the tasks, the number 101.2.1 represents the first subtask for Task 101. The numbering scheme used on both the node tree and the IDEF$_0$ models duplicates the MIL-STD-1388-1A numbering scheme.

## A.3    IDEF$_0$ MODEL - BACKGROUND

IDEF$_0$ is a modeling technique developed during the Air Force Integrated Computer Aided Manufacturing (ICAM) project in the mid-1970s. Known as the ICAM Definition or IDEF$_0$ model. this activity model uses functional diagrams and narrative descriptions to depict the specific steps and operations needed to perform an activity. The model focuses on processes and interfaces and depicts the specific steps and operations needed to perform an activity. Processes are represented as boxes and interfaces as arrows, as illustrated in Figure A-2. Processes can operate simultaneously with other boxes. while interfaces provide constraints for when and how operations are triggered and controlled. An IDEF$_0$ model does not represent time flow, specific sequencing of activities. or data sources and destinations. These properties are reflected in the data flow diagrams presented in Appendix B of this volume.

Where possible, narrative material supporting the IDEF$_0$ diagrams was sourced from Air Force material; in particular the LSA Primer for the LSA Task Series description. and MIL-STD-1388-1A for the LSA Tasks description. Wording may have been changed slightly to improve readability.

*ICOMs*

The IDEF$_0$ model analyzes each task or sub-task in terms of Inputs, Controls, Outputs. and Mechanisms (ICOMs) and interrelationships among the activities. Definitions of ICOMS are given in Figure A-3. The ICOMs indicate the constraints on an activity and the information and materials that are used by, or produced by, the activity. The process name appears in each box. The convention of the process name beginning with an active verb or verb phrase has not been followed in these IDEF$_0$ models: instead the task process name is consistent with MIL-STD-1388-1A. Each process is assigned an identification number for control and reference purposes (for example 202.2.4). This number is useful for tracing the process between subtasks and tasks. The identification number is

noted in the top center of the activity box. Information flow between activities is represented by arrows that interconnect the activity boxes. Information flows are identified by using a noun or noun phrase and linked to the appropriate arrow by a graphic connector.
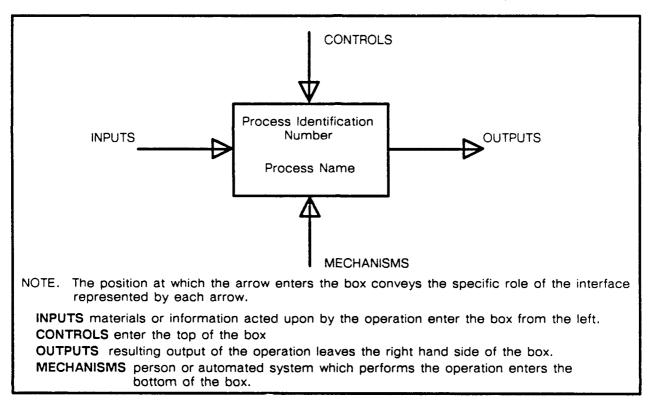


NOTE. The position at which the arrow enters the box conveys the specific role of the interface represented by each arrow.

**INPUTS** materials or information acted upon by the operation enter the box from the left.
**CONTROLS** enter the top of the box
**OUTPUTS** resulting output of the operation leaves the right hand side of the box.
**MECHANISMS** person or automated system which performs the operation enters the bottom of the box.

FIGURE A-2.  MAJOR COMPONENTS OF IDEF$_0$ MODEL

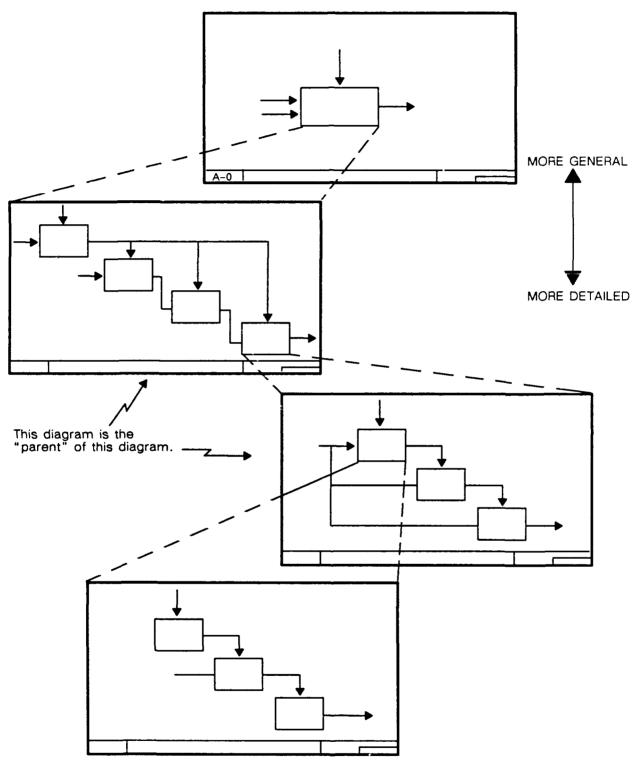| | |
|---|---|
| INPUTS: | An input is information or material that is used to produce the outputs of an activity. Input is consumed or transformed by the activity. Input flows always enter the left side of an activity box. It is not necessary for each activity to have identified Input flows on a diagram. |
| CONTROLS: | A control is information or material which constrains an activity. It regulates the transformation of input into output. Controls however are not changed by the activity as Inputs are. These flows always enter the top of an activity box. If a control governs all the subtasks for an activity, the entry for the lower level activity is left blank. |
| OUTPUTS: | Output is information or materials that are produced by the activity or result from the activity. Output flows always leave the right side of an activity box. Output must be present for evey activity and must show the transformation of the input. |
| MECHANISMS: | Mechanisms are usually machines, resources, or existing systems (hardware /software) that perform the activity or provide energy to the activity. Mechanisms always enter the bottom of an activity box. All activities must have mechanisms. However, they may be intentionally omitted from a diagram. |

FIGURE A-3.  ICOM DEFINITIONS

## MODEL STRUCTURE

The structure of an IDEF$_0$ model is shown in Figure A-4. Here, a series of four diagrams is shown with each diagram's relation to the others. An IDEF$_0$ model starts by representing the whole system as a simple unit – a box with arrow interfaces with functions outside the system. Since the single box represents the system as a whole, the descriptive name written in the box is general. The same is true of the interface arrows since they also represent the complete set of external interfaces to the system as a whole.

The box that represents the system as a single module is then detailed on another diagram with boxes connected by interface arrows. These boxes represent major subfunctions (submodules) of the single parent module. This decomposition reveals a complete set of submodules, each represented as a box whose boundaries are defined by the interface arrows. Each of these submodule boxes may be similarly decomposed to expose even more detail.

An additional feature of the IDEF$_0$ model is the (introduction of the) concept of tunneling. Many IDEF$_0$ diagrams include the symbol (T), which is placed next to some of the arrows to indicate that the data conveyed by these arrows is not relevant to a specified level of detail. Figure A-5 illustrates how the placement of the tunneling symbol affects its meaning in that diagram.

In addition to the graphic representation of the process, the IDEF$_0$ model also consists of of a narrative that uses declarative statements to describe what is happening in each activity box in the diagram, including interaction among activities. It includes the object of each activity and a description of the tasks (decomposition) that are performed to complete the activity.

MORE GENERAL

MORE DETAILED

This diagram is the
"parent" of this diagram.

Every component may be decomposed in another diagram
Every diagram shows the "inside" of a box on a parent diagram
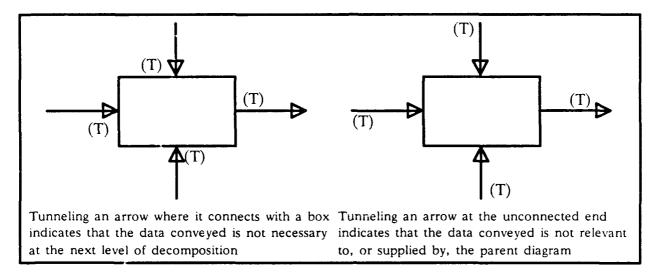
FIGURE A-4. IDEF$_0$ MODEL STRUCTURE

Tunneling an arrow where it connects with a box indicates that the data conveyed is not necessary at the next level of decomposition

Tunneling an arrow at the unconnected end indicates that the data conveyed is not relevant to, or supplied by, the parent diagram

FIGURE A-5. IDEF$_0$ MODELS - TUNNELING

## A.4 LSA CONTEXT LEVEL OVERVIEW - IDEF$_0$ CONTEXT LEVEL

The Context or top-level IDEF$_0$ diagram on page A-12 identifies the major ICOMs of the LSA process. The LSA process is driven primarily by Air Force defined system requirements. In the Context level diagram these are defined as the Mission and Functional Requirements input. Both the logistic and the functional aspects of a weapon system development effort are based on the same requirements and, with LSA invoked, take place as one process.

The mechanisms that perform the LSA process are the Air Force, the Contractor(s) or both. The responsibilities of each organization are identified in the subsequent more detailed IDEF$_0$ diagrams of the LSA process. MIL-STD-1388 governs the LSA process and defines the outputs: LSAR, including the derivative LSAR Reports, and the other LSA documentation, including various studies, plans, and reports.

Most of the LSA process is performed by Contractors; the Air Force is principally responsible for management of LSA. Although there are many controls relating to Integrated Logistics Support (ILS) that affect the LSA process, the primary controls are MIL-STD-1388-1A and MIL-STD-1388-2A. The process results in the output of many LSA Reports controlled by Data Item Descriptions (DIDs). The results of the LSA are stored in the Logistics Support Analysis Record (LSAR).
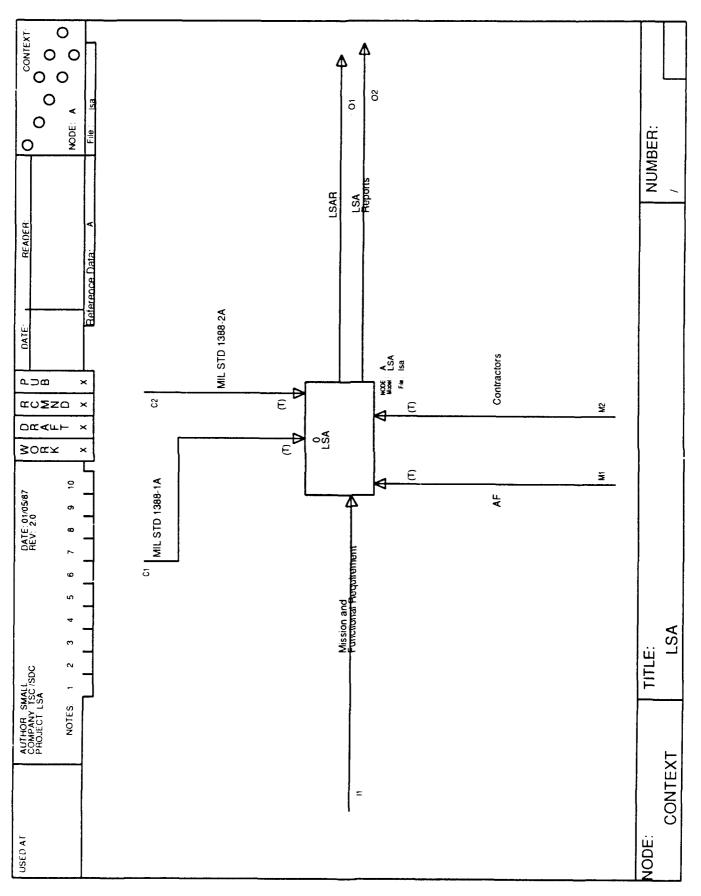
### Summary of Context Level ICOMS:

| | |
|---|---|
| Inputs: | Mission and Functional Requirements. |
| Controls: | MIL-STD-1388-1A, MIL-STD-1388-2A. |
| Outputs: | LSAR, LSA Reports. |
| Mechanisms: | Air Force, Contractors. |

**USED AT:**

**AUTHOR:** SMALL
**COMPANY:** TSC /SDC
**PROJECT:** LSA

**DATE:** 01/05/87
**REV:** 2.0

**NOTES:** 1 2 3 4 5 6 7 8 9 10

| | | | | | |
|---|---|---|---|---|---|
| W O R K | D R A F T | R C M N D | P U B | | |
| X | X | X | X | | |

**READER:** **DATE:** **CONTEXT:**

**NODE:** A

**File:** lsa

**Reference Data:** A

C2

MIL STD 1388-2A

C1 | MIL STD 1388-1A

(T)

(T)

0
LSA

MODE: A
Model LSA
File: lsa

LSAR

LSA
Reports

O1

O2

(T)

(T)

Contractors

AF

M1

M2

I1

Mission and
Functional Requirement

**NODE:** CONTEXT

**TITLE:** LSA

**NUMBER:**

A-12

## A.5    LSA PROCESS – IDEF₀ NODE 0

Node 0 on page A-14 is a functional overview, presenting the first decomposition level of the LSA process. It summarizes the five major LSA series tasks and their interrelation-ships. Examination of Node 0 on a macro level shows that Mission and Functional Re-quirements are primary inputs to the 100, 200, and 300 series tasks. The diagram also shows that task section outputs can act as inputs and/or controls for other task series. For example, Supportability, Cost, and Readiness Drivers are generated from the 200 task series and are data inputs for the 300, 400, and 500 task series. Review procedures, an output of the program planning and control task series, act as a control over the prepara-tion and evaluation of alternatives (300 task series). The Node 0 diagram also shows that the LSAR is just one of many output products that are generated. These additional output products include plans and a variety of reports. This diagram also shows that the 200, 300, 400, and 500 series tasks all generate portions of the LSAR.

No mechanisms are shown on the Node 0 diagram. This is because both the Air Force and Contractor have some involvement in performing each of the five series of tasks. Since the Air Force and Contractor were both identified as mechanisms on the context level diagram, the same information need not be shown again.

Node 0 shows the complexity of the LSA process and gives a representative view of the types of LSA reports that are produced, e.g., Technological Opportunities Report, Use Study Report, and also shows how other MIL-STDs are controls, e.g., MIL-STD-1629 The mechanism in general is a Contractor with the Air Force having a management func-tion. The five major tasks are listed below followed by an overview description of the functions performed in each task.

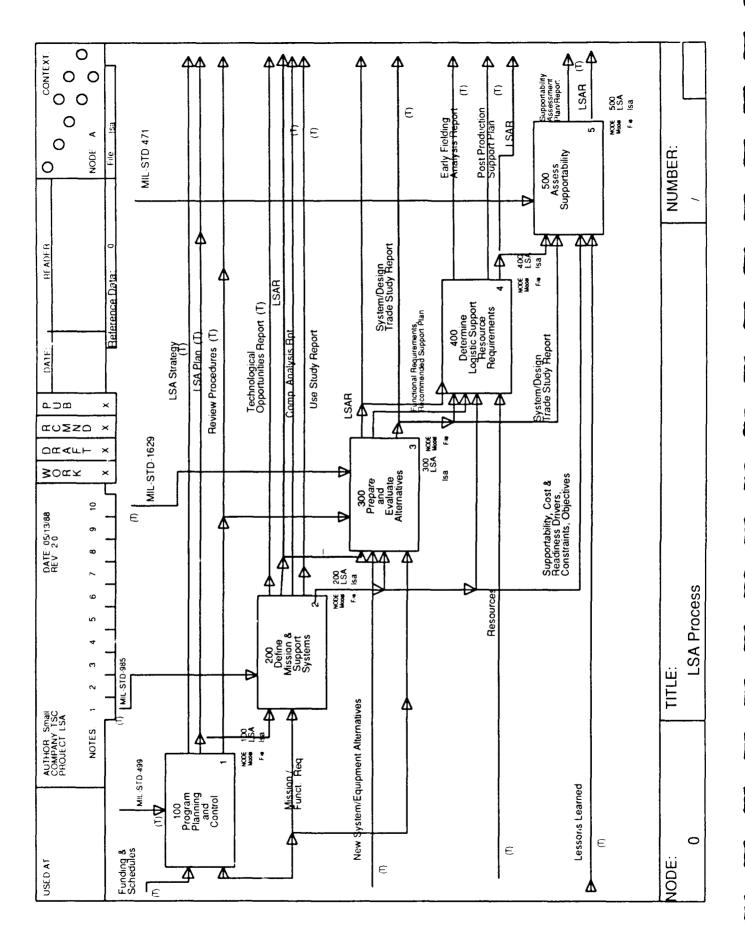LSA Task 100    Program Planning and Control
LSA Task 200    Mission and Support Systems Definition
LSA Task 300    Preparation and Evaluation of Alternatives
LSA Task 400    Determination of Logistics Support Resources Requirements
LSA Task 500    Supportability Assessment

The key to a productive but cost effective analysis effort is the concentration of available resources on activities that most benefit the program. Such a strategy involves establish-ing an LSA program that will meet (evolve) achievable supportability and support system objectives. The broad objectives of LSA are to influence weapon system design, structure the most effective support concept, and define logistic support resource requirements. These general objectives are translated into more specific objectives for individual pro-grams, particularly in early phases when maximum flexibility exists. Objectives are iter-ated and refined until they become firm program goals or requirements. A successful LSA effort requires that identified tasks be completed by the appropriate deadline. This is achieved through continued monitoring of the LSA effort to identify problems as they occur. Efficient program execution requires that working arrangements between the LSA

USED AT

CONTEXT:

AUTHOR: Small   DATE 05/13/88   READER   DATE:   NODE   A
COMPANY TSC      REV 2 0
PROJECT LSA                                              File   lsa

| | | P U B | |
|---|---|---|---|
| W O R K | D R A F T | R C M N D | x |
| | | x | x |
| NOTES | 1 2 3 4 5 6 7 8 9 10 | | Reference Data: 0 |

MIL-STD 471

Funding &
Schedules

MIL-STD 499

(T)

100
Program
Planning
and
Control
1

MIL-STD-985

200
Define
Mission &
Support
Systems
2

Mission/
Funct. Req

New System/Equipment Alternatives

MIL-STD-1629

LSA Strategy (T)

LSA Plan (T)

Review Procedures (T)

Technological
Opportunities Report (T)

Comp Analysis Rpt

LSAR

Use Study Report

300
Prepare
and
Evaluate
Alternatives
3

LSAR

System/Design
Trade Study Report

Functional Requirements
Recommended Support Plan

400
Determine
Logistic Support
Resource
Requirements
4

System/Design
Trade Study Report

Resources

Supportability, Cost &
Readiness Drivers,
Constraints, Objectives

Early Fielding
Analysis Report (T)

Post Production
Support Plan (T)

LSAR

Supportability
Assessment
Plan/Report.

500
Assess
Supportability
5

LSAR

Lessons Learned

NODE: 0   TITLE: LSA Process   NUMBER:

program and other system engineering programs be established to identify mutual interests, maximize the benefits of mutually supporting tasks, and minimize effort overlap.

## A.5.1 LSA Task 100 Series – Program Planning and Control

The 100 series tasks include the overall planning, scheduling, and execution of the remaining LSA tasks. The tasks in this series are performed in parallel by both the Air Force and Contractor. The initial requirements are supplied by the Air Force. Management procedures are established to assure that the right information is available at the right time so that timely decisions can be made. Using the Mission and Functional Requirements from the Statement of Work (SOW) for the required system, and applying the specified funding and schedule constraints, this task series produces the formal LSA Plan and strategy documents. MIL-STD-499 controls much of the effort required by this task, and specifies other significant output products such as conference and formal review agenda, schedules, and results.

### Summary of Task 100 Series ICOMS:

| | |
|---|---|
| Inputs: | Funding and Schedule Constraints, Mission and Functional Requirements from SOW. |
| Controls: | MIL-STD-499. |
| Outputs: | LSA Plan, LSA Strategy, Review Procedures. |
| Mechanisms: | Air Force and/or Contractor. |

## A.5.2 LSA Task 200 Series – Mission and Support Systems Definition

The 200 series tasks (are those tasks which) start the implementation of the LSA Plan for the system being developed/modified. Most of these tasks are performed by the Contractor. Performance of these tasks requires examination of current operational systems and their characteristics, as well as investigation of projected systems and technological capabilities. Generally, Mission and Support Systems Definition tasks are conducted at system and subsystem levels early in the system acquisition process because problem identification and risk analysis are important approaches to dealing with the high levels of uncertainty associated with this phase. Based on the Mission and Functional Requirements of the system, these tasks identify constraints, thresholds, and targets for improvement, and provide supportability data for early tradeoff decisions. New system/equipment supportability and supportability related design constraints are established based upon support systems and resources that will be available when the new system/equipment is fielded. Supportability, cost, and readiness drivers, once identified, provide a basis for a concentrated effort to identify areas for improvement.

When supportability analyses have already been performed as part of mission area, or weapon system analysis performed prior to formal program initiation, the range and scope of the Task 200 series tasks are appropriately tailored to prevent duplication of these efforts. The output reports of the tasks at this level serve primarily as the informa-

tion base for Air Force decisions on some of the particular options and opportunities for the required system, and the data developed is available to other analytic tasks of the LSA process.

**Summary of Task 200 Series ICOMS:**

| | |
|---|---|
| Inputs: | LSA Plan, Mission and Functional Requirements from SOW. |
| Controls: | MIL-STD-965. |
| Outputs: | Technological Opportunities Report, Comparative Analysis Report, Use Study Report, LSAR, Supportability Cost and Readiness Drivers, Constraints and Objectives. |
| Mechanisms: | Contractor (Logistic Engineer, Design Engineer), Air Force (Requiring Authority). |

## A.5.3   LSA Task 300 Series – Preparation and Evaluation of Alternatives

The 300 series tasks are performed by the Contractor and establish weapon system requirements, recommend alternatives, and conduct tradeoff analyses. Early in the life cycle, functions and alternatives are developed only to the level required to analyze differences and conduct tradeoffs. More refined detail is developed by applying these tasks iteratively after some tradeoff decisions are made and the range of alternatives is narrowed.

Node 300 presents the activities associated with the preparation and evaluation of alternatives. The inputs to this task are identified in the analyses performed in the 200 series tasks. The principal output of this task is the Trade Study and Functional Requirements Reports. The LSAR B, B1, B2, and C records are also initiated in this task.

The 300 series tasks are based on the system requirements, and apply the constraints, supportability, cost, and readiness drivers identified in the 200 series tasks. The tasks and reviews completed during the Preparation and Evaluation of Alternatives solidify the functional requirements and result in the formal System/Design Trade Study Report. The support plan is finalized at a time which allows for the development and testing of the necessary ILS element resources to carry out the plan. Analyses of ILS requirements are performed and recommendations made to improve supportability.

The most significant tool used to perform the 300 task series is the Failure Modes, Effects and Criticality Analysis (FMECA), from "Procedures for Performing a Failure Mode, Effect and Criticality Analysis" defined in MIL-STD-1629. FMECA is not part of LSA, but the LSA specifications require FMECA information to be used as the basis for tradeoff analysis. Although they are ILS documentation, FMECA data is not considered LSA data. Despite this distinction, the LSAR documentation produced by this task contains a great deal of FMECA findings.

**Summary of Task 300 Series ICOMS:**

Inputs:      New System/Equipment Alternatives, Mission and Functional Requirements, Supportability, Cost and Readiness Drivers, Constraints and Objectives, LSAR.

Controls:      MIL-STD-1629, Review Procedures (RCM Procedures shown at a lower level).

Outputs:      LSAR, Functional Requirements, Recommended Support Plan, System/ Design Trade Study Report.

Mechanisms:      Contractor (Logistic Engineer/Analyst).

## A.5.4 LSA Task Series 400 – Determination of Logistics Support Resources Requirements

The 400 series tasks identify logistics support resource requirements (personnel, facilities, tools, parts, training etc...) associated with proposed system/equipment alternatives that are identified and refined in earlier LSA tasks. Most of these tasks are performed by the Contractor. As development progresses, the basic design and operational characteristics are established. Specific design and operational data are analyzed to identify the detailed logistics support resource requirements for the principal ILS elements. The results of the Contractor analysis create a major part of the LSAR data.

The analyses and results of this task series address the integration of ILS functions to assure that required support resources are available throughout the development and deployment schedule. For example, the Early Fielding Analysis Report defines the resources required to attain Initial Operating Capability (IOC). At the other end of the deployment schedule, the Post Production Support Plan addresses alternative supply mechanisms for those items that may be unavailable once production is completed.

**Summary of Task Series 400 ICOMS:**

Inputs:      System/Design Trade Study Report, LSAR, Supportability, Cost and Readiness Drivers, Constraints and Objectives, Resources.

Controls:      MIL-STDs for LSAR shown at a lower Level.

Outputs:      Early Fielding Analysis Report, Post Production Support Plan, LSAR.

Mechanisms:      Contractor (Logistic Engineer/Analyst).

## A.5.5 LSA Task 500 Series – Supportability Assessment

The 500 series tasks determine whether the support plan and resources that have been established for acquisition and operation are adequate. Series tasks are performed by the Air Force. Supportability assessment encompasses assessment as part of the formal test and evaluation program, and assessment after deployment through analysis of operational, maintenance, and supply data. In the first case, the assessments are made prior to deployment and, where applicable, upon initial deployment during follow-on test and

evaluation. In the second case, the assessments are made based upon data available about the system/equipment in its normal operating environment.

**Summary of Task 500 Series ICOMS:**

| | |
|---|---|
| Inputs: | System/Design Trade Study Report, Supportability Cost and Readiness Drivers, Constraints and Objectives. Lessons Learned. LSAR. |
| Controls: | MIL-STD-471 |
| Outputs: | Supportability Assessment Plan/Report, LSAR. |
| Mechanisms: | Contractor. |

## A.6  LSA TASK 100 SERIES – PROGRAM PLANNING AND CONTROL – IDEF$_0$ NODE 100

Node 100 on page A-19 presents the program planning and control tasks within LSA. The overall goal of this task is to develop a Plan and Strategy that will meet the goals of the Mission and Functional Requirements on time and within budget.

*LSA Task 101 – Development of an Early Logistics Support Analysis Strategy*

This task is the earliest planning activity for an LSA program. Its purpose is to develop a proposed LSA program strategy for use early in an acquisition program and to identify the LSA tasks and subtas. s which provide the best return on investment. The LSA strategy interrelates with the acquisition strategy and is included in the ILS plan. It is generally available prior to preparation of any solicitation document containing LSA task requirements, and can be used as a guide in developing such documents.

The initial LSA strategy development, under control of DI-L-7114, begins in the preconcept phase concurrent with development of the acquisition strategy. The LSA strategy is generally updated through the Demonstration/Validation phase. Updates are completed prior to initiation of the next program phase, so that the updated LSA strategy is available concurrent with phase initiation.

The requiring authority is responsible for performing Task 101 to provide for early management of the LSA program prior to initiation of Concept Exploration Phase. The implementing authority assumes responsibility for the task prior to Demonstration/Validation and retains responsibility through subsequent phases.

**Summary of Task 101 ICOMS:**

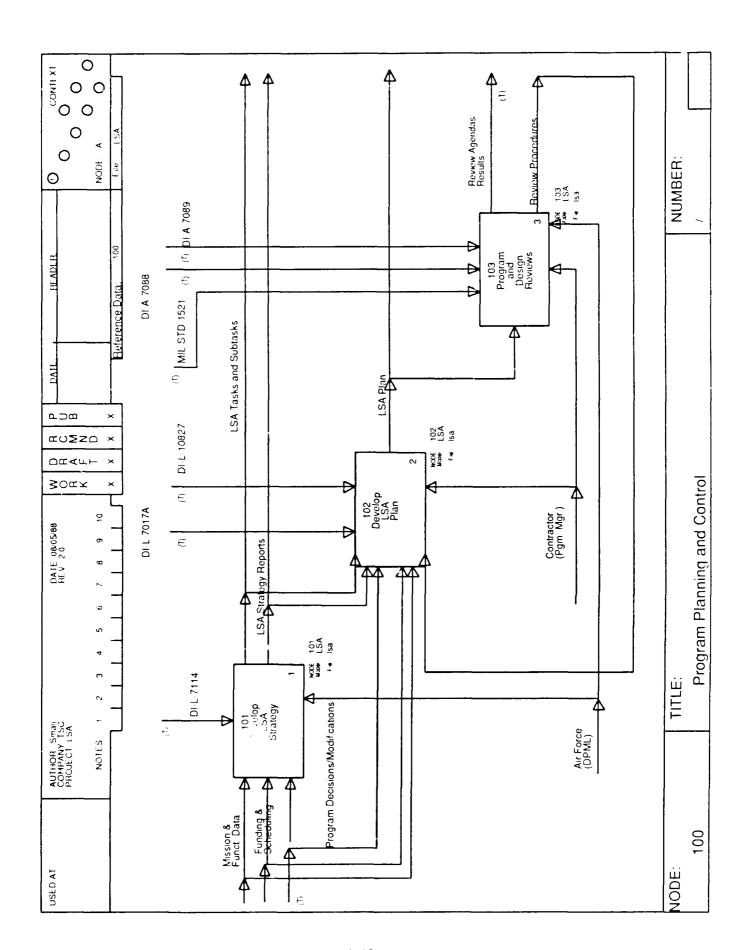| | |
|---|---|
| Inputs: | Mission and Functional Requirements, Funding and Scheduling from SOW, Program Decisions/Modifications. |
| Controls: | DI-L-7114. |
| Outputs: | LSA Tasks and Subtasks to SOW. LSA Strategy to ILSP. |
| Mechanisms: | Air Force. |

AUTHOR Small
COMPANY TSC
PROJECT LSA

DATE 08/05/88
REV 2.0

NOTES 1 2 3 4 5 6 7 8 9 10

| WORK | x |
| DRAFT | x |
| RECOMMEND | x |
| PUB | x |

READER

DATE

CONTEXT: X1

NODE: A

File: LSA

Reference Data

100

DI-A 7089 (I)

DI-A 7088

MIL STD 1521 (I)

DI-L 10827 (I)

DI-L 7017A (I)

DI-L 7114 (I)

Reference Data

LSA Tasks and Subtasks

LSA Strategy Reports

LSA Plan

Mission & Funct Data

Funding & Scheduling

Program Decisions/Modifications

Review Agendas Results (I)

Review Procedures (I)

**101 Develop LSA Strategy**
1
NODE 101 LSA Mode Isa

**102 Develop LSA Plan**
2
NODE 102 LSA Mode Isa

**103 Program and Design Reviews**
3
NODE 103 LSA Mode Isa

Contractor (Pgm Mgr.)

Air Force (DPML)

TITLE: Program Planning and Control

NUMBER:

NODE: 100

A-19

*LSA Task 102 – Development of Logistics Support Analysis Plan*

The purpose of Task 102 is to develop a Logistics Support Analysis Plan (LSAP) that will effectively document the LSA management structure and authority; the LSA tasks to be accomplished; when each task will be accomplished; which organizational units will be responsible for accomplishing each task; how all tasks are integrated; and how results of each task will be used. The LSAP, which is generally prepared in the Concept Exploration Phase and is updated in all subsequent phases, is a basic tool for establishing and executing an effective LSA program.

**Summary of Task 102 ICOMS:**

| | |
|---|---|
| Inputs: | LSA Strategy from Task 101, Program Decisions/Modifications, Funding and Scheduling, Mission and Functional Requirements from SOW, LSA Tasks and Subtasks from Task 101. |
| Controls: | DI–L–7017A, DI–L–10827. |
| Outputs: | LSA Plan. |
| Mechanisms: | Contractor. |

*LSA Task 103 – Providing Program and Design Reviews*

This task provides timely LSA program participation in the official review and control of design information; scheduling of detailed LSA program reviews; and logistic risk assessments at program reviews. It also ensures that all pertinent aspects of the LSA program are addressed as an integral part of all formal program and design reviews. These procedures for the review of design information from a support standpoint within the performing activity provide logistic support specialists with a mechanism for accomplishing design influence and tradeoffs. LSA program reviews aid in monitoring the overall process, quality and consistency of the LSA effort. Program and design reviews are generally initiated during the Concept Exploration Phase and are scheduled periodically throughout subsequent phases.

During the Concept Exploration Phase, the requiring authority is responsible for this task. During Demonstration/Validation and subsequent phases, the implementing authority assumes responsibility for this task. The Contractor supports the reviews by supplying the necessary data to the Air Force and by providing Contractor personnel to supply supporting documentation where necessary.

**Summary of Task 103 ICOMS:**

| | |
|---|---|
| Inputs: | LSA Plan from Task 102. |
| Controls: | DI–A–7088, DI–A–7089, MIl –STD–1521. |
| Outputs. | Review Agendas/Results, Review Procedures. |
| Mechanisms: | Air Force (DPML), Contractor (Program Manager). |

### A.6.1 LSA Task 101 – Develop an Early Logistics Support Analysis Strategy – IDEF$_0$ Node 101

Node 101 on page A-22 presents the activities associated with developing an LSA strategy. Inputs to Task 101 are the Mission and Functional Requirements, Funding and Schedule Constraints. Outputs are Plans and Strategy. This task is primarily performed by Air Force management with assistance from Contractors. Within Task 101 there are two major subtasks that are identified and discussed below.

**LSA Subtask 101.2.1 – Develop LSA Strategy.** This task is the earliest Planning Activity in the LSA program and is the key first step in developing the most cost effective program. Analyzing probable design and operational approaches, supportability characteristics, and available data before finalizing task requirements assures that the LSA program is focused on the key areas which provide maximum supportability impact on design.

Many other pieces of information gained from previous analyses or data bases are also used in the development of the LSA Strategy. This task is always performed by the Air Force.

**Summary of Subtask 101.2.1 ICOMS:**

| | |
|---|---|
| Inputs: | Previous Analyses (Air Staff, PMD), Funding/Schedule Constraints from SOW, Program Action Directive (PAD), Form 1208), Data Bases (P040E AFM 66-1, K051, VAMOCS, D056, D041), Mission and Functional Requirements (System Operational Requirements (SORD), AFR 57-1). |
| Controls: | DI-L-7114. |
| Outputs: | LSA Tasks and Subtasks and any additional Tasks (to SOW), LSA Strategy (to ILSP). |
| Mechanisms: | Air Force (DPML). |

**LSA Subtask 101.2.2 – Update LSA Strategy.** Prior to the end of each phase in the acquisition process, plans for the next phase are developed. As a result of these plans, modifications to existing plans, and program schedule changes, an LSA strategy for the next phase is developed. As in the original strategy, the LSA task requirements and organization to accomplish those tasks are planned. This task is performed by the Air Force.
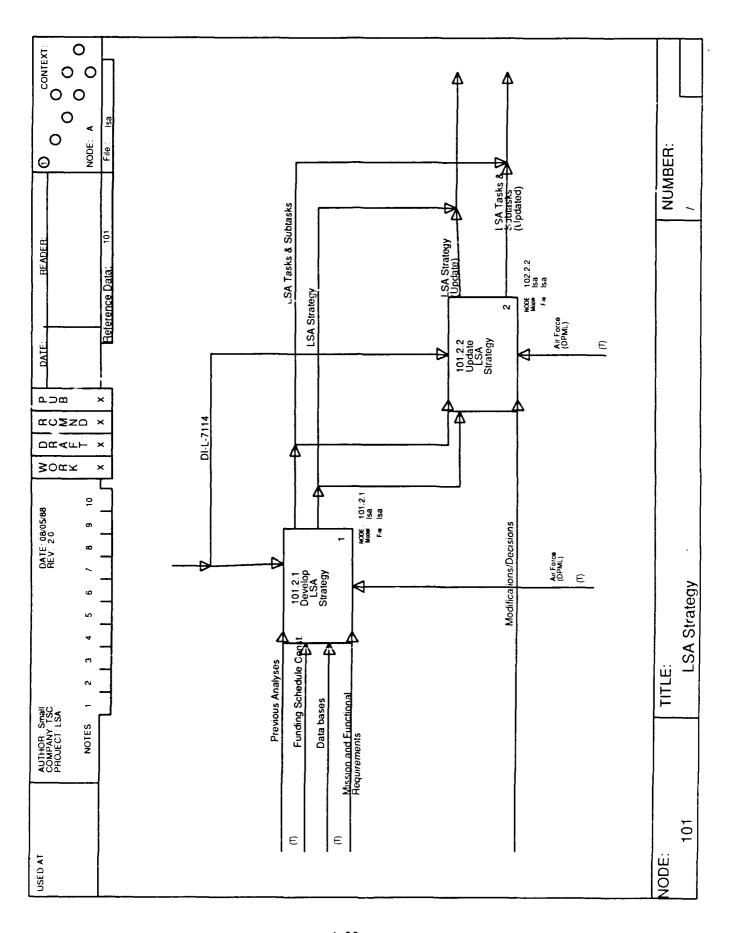
**Summary of Subtask 101.2.2 ICOMS:**

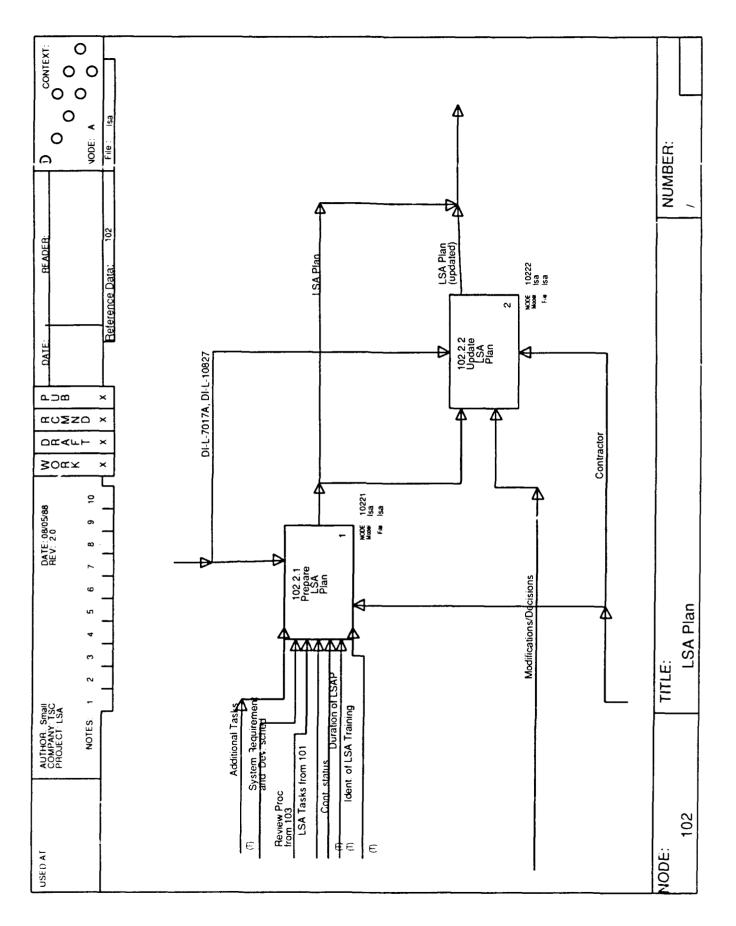| | |
|---|---|
| Inputs: | LSA Strategy from Subtask 101.2.1, LSA Tasks and Subtasks from Subtask 101.2.1, Modifications/Decisions. |
| Controls: | DI-L-7114. |
| Outputs: | Updated LSA Strategy, Updated LSA Tasks and Subtasks. |
| Mechanisms: | Air Force (DPML). |

USED AT:

AUTHOR: Small
COMPANY: TSC
PROJECT: LSA

DATE: 08/05/88
REV: 2.0

NOTES: 1 2 3 4 5 6 7 8 9 10

| WORK | DRAFT | RECMND | PUB |
|---|---|---|---|
| X | X | X | X |

READER:   DATE:   CONTEXT:

Reference Data: 101

NODE: A   File: lsa

Previous Analyses

Funding Schedule Const.

Data bases

Mission and Functional Requirements

Modifications/Decisions

DI-L-7114

101.2.1
Develop
LSA
Strategy
1

NODE: 101.2.1   Model: lsa   File: lsa

LSA Tasks & Subtasks

LSA Strategy

101.2.2
Update
LSA
Strategy
2

LSA Strategy (Update)

LSA Tasks & Subtasks (Updated)

NODE: 102.2.2   Model: lsa   File: lsa

Air Force (DPML)

Air Force (DPML)

NODE: 101

TITLE: LSA Strategy

NUMBER:

## A.6.2 LSA Task 102 – Prepare the Logistics Support Analysis Plan – IDEF$_0$ Node 102

Node 102 on page A-24 presents the activities associated with preparing the LSAP. The LSAP is the basic tool for establishing and executing an effective LSA program. It documents the LSA tasks to be accomplished, when each task will be accomplished, the organizational units responsible for their accomplishment, and how the results of each task will be used. The LSAP can be either a stand alone document or part of the ISP. Inputs come from many ILS areas all of which are included in the LSA Plan to make one integrated plan for support. Contractor management generally develops the LSA Plan under the direct supervision of the Air Force. Within Task 102 there are two major subtasks which are identified and discussed below.

**LSA Subtask 102.2.1 – Prepare LSA Plan.** The LSAP is the integrating plan for all ILS tasks and data, interfacing with the following programs:

- System/Equipment Design Program
- System/Equipment Reliability Program
- System/Equipment Maintainability Program
- Human Engineering Program
  - Standardization Program
  - Parts Control Program
  - System Safety Program
  - Packaging, Handling, Storage, and Transportability Program
  - Initial Provisioning Program
  - Survivability Program
  - System/Equipment Testability Program
  - Technical Publications Program
  - Training and Training Equipment Program
  - Facilities Program
  - Support Equipment Program
  - Test and Evaluation Program

The LSAP also contains the Work Breakdown Structure (WBS) identification of items upon which LSA will be performed and documented, and an explanation of the LSA control numbering system. The LSAP controls the interface between the Air Force and the Contractor and contains information such as procedures for updating and validating LSA data, procedures for recording design problems or deficiencies, descriptions of data collection systems to be used, government data to be furnished, and government furnished equipment to be used. The LSA Plan is usually prepared by the Contractor but is the responsibility of the Air Force.

USED AT:

AUTHOR: Small
COMPANY: TSC
PROJECT: LSA

DATE: 08/05/88
REV: 2.0

NOTES: 1 2 3 4 5 6 7 8 9 10

| | | |
|---|---|---|
| WORK | x | |
| DRAFT | x | |
| RECOMMENDED | x | |
| PUBLICATION | x | |

READER:

DATE:

CONTEXT:

NODE: A

Reference Data: 102

File: lsa

Additional Tasks (f)

System Requirement and Dev. sched.

Review Proc from 103

LSA Tasks from 101

Cont. status

Duration of LSAP

Ident. of LSA Training (f)

(f)

DI-L-7017A, DI-L-10827

1
102.2.1
Prepare
LSA
Plan

NODE: 10221
Model: lsa
File: lsa

LSA Plan

2
102.2.2
Update
LSA
Plan

NODE: 10222
Model: lsa
File: lsa

LSA Plan (updated)

Modifications/Decisions

Contractor

NODE: 102

TITLE: LSA Plan

NUMBER: /

**Summary of Subtask 102.2.1 ICOMS:**

Inputs:            LSA tasks from Task 101, Additional tasks from SOW (e.g. LSAR Validation Rules, Air Force Organization Structure to be Used), System Requirements and Development Schedule from System Specifications, Review Procedures from Task 103, Contract Status, Duration of LSAP, Identification of LSA Training to be Provided from LSA Strategy.

Controls:          DI-L-7017A, DI-L-10827.

Outputs:           LSA Plan.

Mechanisms:        Contractor.

**LSA Subtask 102.2.2 – Update LSA Plan.** The LSAP is intended to be a dynamic document that reflects current program status and planned actions. Accordingly, procedures are established for updates and approval of updates by the requiring authority when conditions warrant. Program schedule changes, test results, or LSA task results may dictate a change in the LSAP if it is to be used effectively as a management document.

**Summary of Subtask 102.2.2 ICOMS:**

Inputs:            LSA Plan from Subtask 102.2.1, Modifications/Decisions (e.g. Program Revisions, Design Changes).

Controls:          DI-L-7017A, DI-L-10827.

Outputs:           Updated LSA Plan.
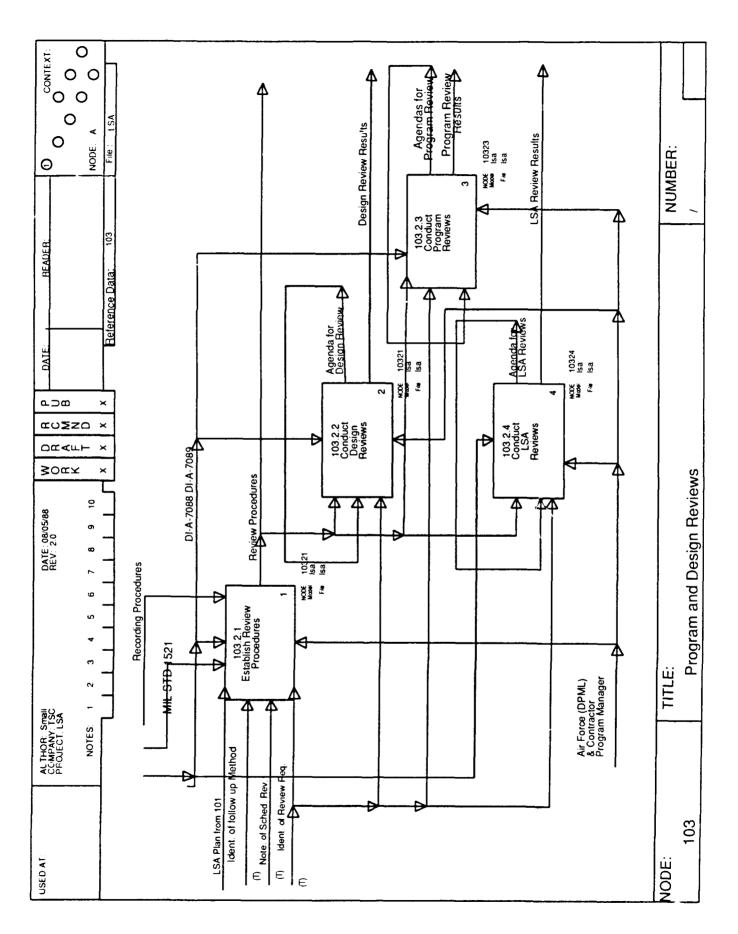
Mechanisms:        Contractor.

**A.6.3   LSA Task 103 – Perform Program and Design Reviews – IDEF$_0$ Node 103**

Node 103 on page A-26 presents the activities associated with performing program and design reviews. This task includes four types of reviews: (1) review of design information from a supportability standpoint; (2) system/equipment design reviews; (3) formal system/equipment program reviews; and (4) detailed LSA program reviews.

Design information reviews provide supportability specialists with the authority to manage design influence and tradeoffs. Contractor procedures for this type of review are included in the LSAP and are controlled by DI-A-7088 and DI-A-7089. System/equipment design reviews, program reviews, and LSA reviews are an important management and technical tool of the requiring authority. They should be specified in SOWs to assure adequate staffing and funding and should be held periodically during the acquisition program to evaluate overall program progress, consistency, and technical adequacy.

An overall LSA program status review is an integral part of these reviews whether conducted internally, with subcontractors, or with the requiring authority. The results of the implementing authority's internal and subcontractor reviews should be documented and made available to the requiring authority on request. Review procedures are developed by the Air Force. The reviews themselves are performed by both DPML and Contractor

Program and Design Reviews

management. Within Task 103 there are four major subtasks that are identified and discussed below.

**LSA Subtask 103.2.1 – Establish Review Procedures.** This task establishes and documents design review procedures. These procedures define accept/reject criteria pertaining to supportability requirements, the method of documenting reviews, the types of design documentation subject to review, and the degree of authority of each reviewing activity.

### Summary of Subtask 103.2.1 ICOMS:

| | |
|---|---|
| Inputs: | LSA Strategy from Subtask 101, Identification of Reviews Required from SOW, Notification of Scheduled Reviews, Identification of Follow Up Method from SOW. |
| Controls: | DI-A-7088, DI-A-7089, Recording Procedures, MIL-STD-1521. |
| Outputs: | Review Procedures. |
| Mechanisms: | Air Force (DPML), Contractor (Program Manager). |

**LSA Subtask 103.2.2 – Conduct Design Reviews.** Formal review and assessment of supportability and supportability related design contract requirements is an integral part of each system/equipment design review (SDR), preliminary design review (PDR), and critical design review (CDR) specified by the contract. The contractor schedules reviews with subcontractors and suppliers, as appropriate, and informs the requiring authority in advance of each review. Results of each system/equipment design review are documented. Design reviews identify and discuss all pertinent aspects of the LSA program.

### Summary of Subtask 103.2.2 ICOMS:

| | |
|---|---|
| Inputs: | Review Procedures from Subtask 103.2.1, Identification of Reviews Required from SOW, Agendas for Design Reviews. |
| Controls: | DI-A-7088, DI-A-7089. |
| Outputs: | Agendas for Design Reviews, Design Review Results to ISP, ILSP, LSAP. |
| Mechanisms: | Air Force (DPML) and Contractor (Program Manager). |

**LSA Subtask 103.2.3 – Conduct Program Reviews.** Formal review and assessment of supportability and supportability related program contract requirements is an integral part of each system/equipment program review specified by the contract. The contractor schedules program reviews with subcontractors and suppliers, as appropriate, and informs the requiring authority in advance of each review. Results of each system/equipment program review are documented. Program reviews identify and discuss all pertinent aspects of the LSA program.

### Summary of Subtask 103.2.3 ICOMS:

| | |
|---|---|
| Inputs: | Review Procedures from Subtask 103.2.1, Identification of Reviews Required from SOW, Agendas for Program Reviews. |

| Controls: | DI–A–7088, DI–A–7089. |
| Outputs: | Agendas for Program Reviews, Program Review Results to ISP, ILSP, LSAP. |
| Mechanisms: | Air Force (DPML) and Contractor (Program Manager). |

**LSA Subtask 103.2.4 – Conduct LSA Reviews.** In addition to system/equipment program and design reviews, specific reviews of the LSA program are conducted periodically. These reviews provide a more detailed coverage of items addressed at program and design reviews and address progress of all LSA tasks specified in the SOW. Representative discussion items include task results, data status of assigned actions, design and supportability problems, test schedule and progress, and the status of subcontractor's and supplier's efforts. LSA reviews are conducted as part of ILS reviews when possible and are specified and scheduled in the SOW. An integral part of this review process is a detailed guidance conference conducted as soon as possible after contract award to assure a thorough and consistent understanding of the LSA requirements between the requiring and implementing authorities and the contractor. In addition the requiring authority establishes review policies that maximize the resources available for review. Considerations addressed when establishing the review policies include sampling rather than conducting a 100 percent review of LSA data, scheduling reviews on an as required rather than a fixed schedule basis, and concentrating on drivers and high risk areas.

### Summary of Subtask 103.2.4 ICOMS:

| Inputs: | Review Procedures from Subtask 103.2.1, Identification of Reviews Required from SOW, Agendas for LSA Reviews. |
| Controls: | DI–A–7088, DI–A–7089. |
| Outputs: | Agendas for LSA Reviews, LSA Review Results to ISP, ILSP, LSAP. |
| Mechanisms: | Air Force (DPML) and Contractor (Program Manager). |
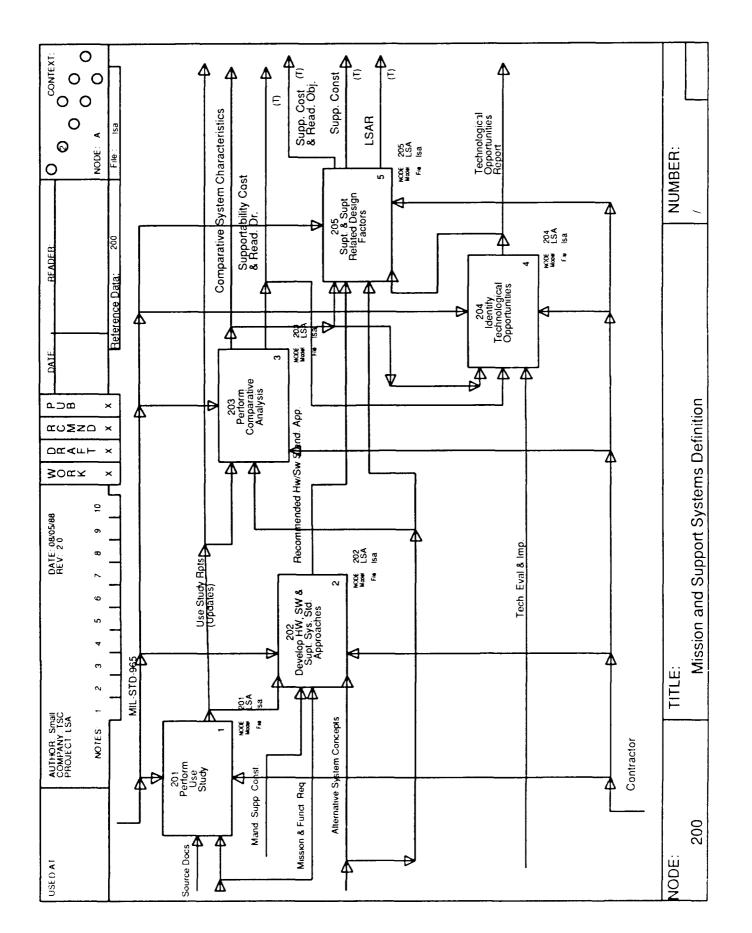
## A.7    LSA TASK 200 SERIES – MISSION AND SUPPORT SYSTEM DEFINITION – IDEF$_0$ – NODE 200

Node 200 on page A-29 presents the activities associated with mission and support system definition. The purpose of this task is to be as specific as possible, in each phase, about the requirements for support systems. Information about new technology, comparative systems, mission and functional requirements are analyzed by engineers to provide the information required for further analysis and approval. Reports such as Use Study Reports, Technological Opportunities Reports and information regarding supportability cost and readiness drivers, constraints, and objectives are produced. All LSA 200 Series Tasks are performed by the Contractor

*LSA Task 201 – Use Study*

This task identifies pertinent factors related to the intended use of the proposed system. In addition, the Use Study documents the resultant quantitative data which must be con-

IDEF0 Diagram — Node 200: Mission and Support Systems Definition

USED AT:

AUTHOR: Small
COMPANY: TSC
PROJECT: LSA

DATE: 08/05/88
REV: 2.0

NOTES: 1 2 3 4 5 6 7 8 9 10

| WORK | x |
| DRAFT | x |
| RECMD | x |
| PUB | x |

READER

DATE

CONTEXT:

NODE: A

Reference Data: 200

File: lsa

Boxes:
- 201 Perform Use Study (NODE 201 LSA, Model, File lsa)
- 202 Develop HW, SW & Supt. Sys. Std. Approaches (NODE 202 LSA, Model, File lsa)
- 203 Perform Comparative Analysis (NODE 203 LSA, Model, File lsa)
- 204 Identify Technological Opportunities (NODE 204 LSA, Model, File lsa)
- 205 Supt. & Supt. Related Design Factors (NODE 205 LSA, Model, File lsa)

Labels:
- Source Docs
- Mand. Supp. Const.
- Mission & Funct. Req.
- Alternative System Concepts
- MIL-STD-965
- Use Study Rpts (Updates)
- Recommended Hw/Sw Std. App.
- Comparative System Characteristics
- Supportability Cost & Read. Dr.
- Supp. Cost & Read. Obj. (T)
- Supp. Const (T)
- LSAR (T)
- Technological Opportunities Report
- Tech Eval & Imp.
- Contractor

NODE: 200
TITLE: Mission and Support Systems Definition
NUMBER:

sidered in developing support alternatives. Significant quantitative support factors (e.g., operating requirements, transportation modes/times, allowable maintenance periods, and environmental requirements) identified by the Use Study are incorporated in the Statement of Operational Need (SON) and Operational and Organizational (O&O) Plan.

The Use Study is the prerequisite to all other analysis tasks and is initiated in the Preconcept Phase. Updates of the Use Study are generally applicable through Full Scale Development. Once the planned operational and support environment of the new system is identified, field visits to existing units and depots that simulate those environments can provide significant input into Use Study updates. Task 201 is the responsibility of the implementing authority throughout all acquisition phases.

**Summary of Task 201 ICOMS:**

Inputs:          Source Documents (SON, PMD, SORD), Mission and Functional Requirements.

Controls:       MIL-STD-965.

Outputs:       Use Study Reports and Updates to SORD, SON, O&O Plan.

Mechanisms:    Contractor.

*LSA Task 202 – Mission Hardware, Software and Support System Standardization*

This task defines the support and support related design constraints based upon support standardization considerations. It also provides support related input to mission hardware and software standardization efforts.

Task 202 is initiated during the Concept Exploration Phase to establish support system standardization requirements before the design effort begins. This task continues to be iterated to progressively lower hardware levels through the Demonstration/Validation phase. During the Production (PROD) phase, Task 202 is applicable to design changes only.

Task 202 is the responsibility of the requiring authority during the Concept Exploration Phase. During the Demonstration/Validation and subsequent phases, the implementing authority has responsibility for this task. The Standardization and the Parts Control Program (MIL-STD-965) is the data used for these latter phases. Coordination with these programs is required to avoid duplication of effort.

**Summary of Task 202 ICOMS:**

Inputs:          Use Study Reports and Updates from Task 201, Mandatory Supportability Constraints from Planning Documents, Mission and Functional Requirements, Alternative System Concepts.

Controls:       MIL-STD-965.

Outputs:       Recommended Hardware/Software Standardization Approaches.

Mechanisms:    Contractor.

*LSA Task 203 – Comparative Analysis*

This task provides a sound analytical foundation for establishing new system design and supportability features. It identifies features that need improvements; defines the features that drive the cost, support, and readiness of the new system; and documents the risks involved in using the comparative data in subsequent analyses.

Supportability factors to be incorporated in the Justification for Major System New Start (JMSNS) are identified during the preconcept phase. Comparative analysis reports are updated through the Full Scale Development phase.

The requiring authority has responsibility for Task 203 during both the Preconcept and Concept Evaluation phases. Performance of Task 203 during the Demonstration/Validation and the Full Scale Development phase is the responsibility of the implementing authority.

**Summary of Task 203 ICOMS:**

| | |
|---|---|
| Inputs: | Use Study Reports and Updates from Task 201, Alternative System Concepts. |
| Controls: | MIL-STD-965. |
| Outputs: | Comparative Supportability Characteristics, Supportability Cost and Readiness Drivers. |
| Mechanisms: | Contractor. |

*LSA Task 204 – Technological Opportunities*

This task is designed to identify technological advancements and state-of-the-art approaches that offer opportunities for achieving new system support improvements. Emphasis is placed on using available technology to improve the support, cost, and readiness values projected for the new system, and to resolve qualitative support problems identified on comparable systems.

Task 204 is initiated during Concept Evaluation Phase and is updated during the Demonstration/Validation Phase. This task is only selectively applicable during Full Scale Development.

The requiring authority is responsible for Task 204 during the Concept Evaluation Phase. Responsibility for this task is assigned to the implementing authority during the Demonstration/Validation Phase and as applicable during Full Scale Development.

**Summary of Task 204 ICOMS:**

| | |
|---|---|
| Inputs: | Comparative Supportability Characteristics from Task 203, Supportability Cost and Readiness Drivers from Task 203, Technological Evaluations and Improvements. |
| Controls: | MIL-STD-965. |

Outputs: Technological Opportunities Report.
Mechanisms: Contractor.

*LSA Task 205 – Supportability and Supportability Related Design Factors*

This task is designed to establish quantitative support characteristics of alternative design and operational concepts. It identifies supportability and supportability related design objectives, goals, thresholds, and constraints. Design constraints are documented in Specifications, and requirements, decision, and program locuments.

Most of Task 205 is initiated during the Concept Evaluation Phase and updated during the Demonstration/Validation Phase. Subtask 205.2.3 (Specification Requirements) is generally applicable through Full Scale Development. Subtask 205.2.5 (Supportability Goals and Thresholds) is only applicable during the Demonstration/Validation Phase.

The implementing authority retains responsibility for establishing support and support related design constraints (Subtask 205.2.3) during all applicable life cycle phases. The implementing authority also assumes responsibility for identifying NATO constraints during Demonstration and Validation (D&V). All other subtasks are the responsibility of the requiring authority during the Concept Evaluation Phase and the Demonstration/Validation Phase.

**Summary of Task 205 ICOMS:**

Inputs: Technological Opportunities Report from Task 204, Recommended Hardware/ Software Standardization Approaches from Task 202, Comparative Supportability Characteristics from Task 203, Alternative System Concepts.

Controls: MIL-STD-965.

Outputs: Supportability Cost and Readiness Objectives, Supportability Constraints, LSAR Data.
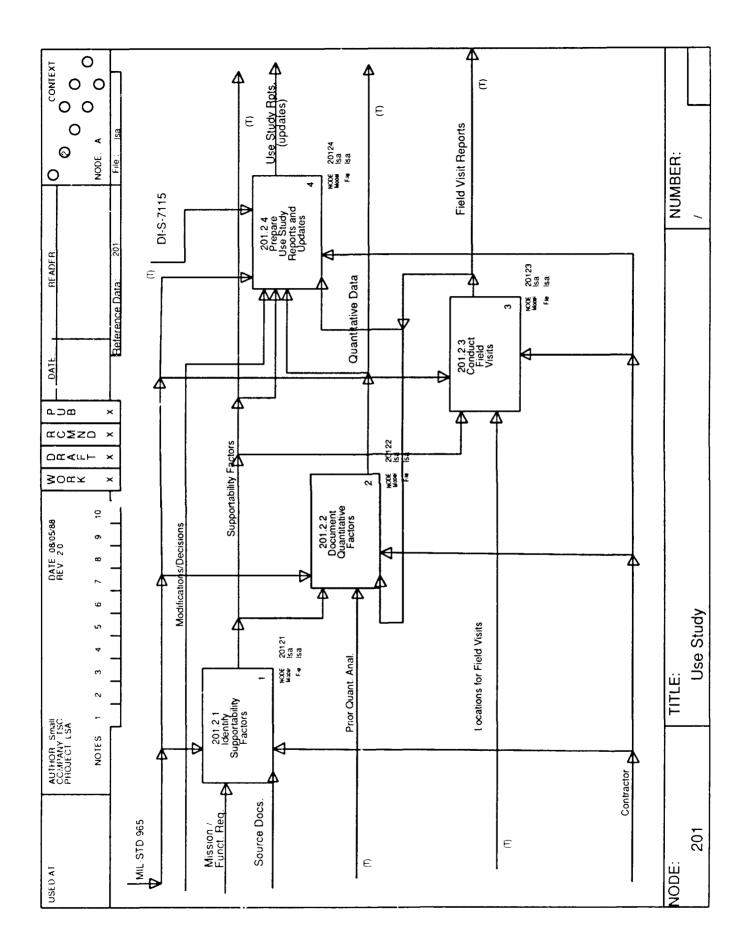
Mechanisms: Contractor.

## A.7.1 LSA Task 201 – Develop a Use Study – IDEF$_0$ Node 201

Node 201 on page 33 presents an IDEF$_0$ model of the activities necessary to develop a Use Study. The Use Study identifies how the system/equipment should be used, when it should be used, where it should be used, why it should be used and what it should be used for. The primary input is Mission and Functional Requirements. The four subtasks are identified and discussed below.

**LSA Subtask 201.2.1 – Identify Supportability Factors.** This subtask identifies and documents the pertinent supportability factors related to the intended use of the new system/ equipment. The following factors are considered: mobility requirements; deployment scenarios; mission frequency and duration; basing concepts; anticipated service life; interactions with other systems/end items; operational environment; and human capabilities and

AUTHOR: Small
COMPANY: TSC
PROJECT: LSA

DATE: 08/05/88
REV: 20

NOTES 1 2 3 4 5 6 7 8 9 10

| WORK | X |
| DRAFT | X |
| RECMND | X |
| PUB | X |

READER

DATE

CONTEXT

NODE: A

File: Isa

Reference Data: 201

MIL STD 965

DI-S-7115

Mission / Funct. Req.

Source Docs.

**201.2.1 Identify Supportability Factors** 1
NODE 20121
Model Isa
File Isa

Modifications/Decisions

Supportability Factors

Prior Quant. Anal.

**201.2.2 Document Quantitative Factors** 2
NODE 20122
Model Isa
File Isa

Quantitative Data

Locations for Field Visits

**201.2.3 Conduct Field Visits** 3
NODE 20123
Model Isa
File Isa

Contractor

Field Visit Reports

**201.2.4 Prepare Use Study Reports and Updates** 4
NODE 20124
Model Isa
File Isa

Use Study Rpts. (updates)

NODE: 201

TITLE: Use Study

NUMBER: /

limitations. Both peacetime and wartime employment are considered in identifying the supportability factors. Previously conducted mission area analyses, any weapon system analyses which quantified relationships between hardware, mission, and supportability parameters and which are pertinent to the new system/equipment are also identified and documented.

**Summary of Subtask 201.2.1 ICOMS:**

| | |
|---|---|
| Inputs: | Mission/Functional Requirements (SORD, AFR 57–1), Source Documents (Trade Study Reports from Task 303, SON, PMD, SORD, Mission Statement). |
| Controls: | MIL–STD–965. |
| Outputs: | Supportability Factors. |
| Mechanisms: | Contractor. |

**LSA Subtask 201.2.2 – Document Quantitative Factors.** This subtask documents the quantitative data from Subtask 201.2.1. Data are used for developing support alternatives and conducting support analyses. This task will develop the initial support system requirements.

**Summary of Subtask 201.2.2 ICOMS:**

| | |
|---|---|
| Inputs: | Supportability Factors from Subtask 201.2.1, Prior Quantitative Analyses (Planning Documents, e.g., Manpower Requirements). |
| Controls: | MIL–STD–965. |
| Outputs: | Quantitative Data. |
| Mechanisms: | Contractor. |

**LSA Subtask 201.2.3 – Conduct Field Visits.** Field visits to operational units and support activities that most closely represent the planned operational and support environment for the new system/equipment are conducted in this task. These visits result in the identification of existing capabilities, resources and problems for the new system/equipment.

**Summary of Subtask 201.2.3 ICOMS:**

| | |
|---|---|
| Inputs: | Locations for Field Visits from Program Office Using Command, Supportability Factors from Subtask 201.2.1. |
| Controls: | MIL–STD–965. |
| Outputs: | Field Visit Reports. |
| Mechanisms: | Contractor. |

**LSA Subtask 201.2.4 – Prepare Use Study Reports and Updates.** In this subtask an engineer prepares a Use Study Report documenting the information developed during performance of Subtasks 201.2.1, 201.2.2, 201.2.3. The Use Study Report is updated as more detailed information on the intended use of the new system/equipment becomes available.

**Summary of Subtask 201.2.4 ICOMS:**

Inputs:            Modifications/Decisions, Supportability Factors from Subtask 201.2.1, Quantitative Data from Subtask 201.2.2, Field Visit Reports from Subtask 201.2.3..

Controls:          DI-S-7115, MIL-STD-965.

Outputs:           Use Study Reports and Use Study Report Updates to SORD.

Mechanisms:        Contractor.

**A.7.2   LSA Task 202 – Mission Hardware Software and Support Systems Standardization – IDEF$_0$ Node 202**

Node 202 on page A-36 presents the tasks involved in assuring standardization of components of new system/equipment. Knowing what is available, what are the standard components, and what are the requirements (Use Study) of the new system/equipment are essential to develop recommendations for standardization within the new system/equipment. Engineers normally perform this function. The four subtasks are identified and discussed below.

**LSA Subtask 202.2.1 – Identify Supportability Constraints.** In this subtask logistics engineers identify existing and planned logistic support resources that have potential benefits for use on each system/equipment concept under consideration. All elements of ILS are considered. Supportability and supportability related design constraints are defined in quantitative terms for those items that will become program constraints due to cost, manpower, personnel, readiness, or support policy considerations and benefits. DIDs related to standard and nonstandard parts, their selection and specification are the task controls.

**Summary of Subtask 202.2.1 ICOMS:**

Inputs:            Use Study from Task 201, Mandatory Supportability Constraints from Planning Documents, Available Resources (DO61, MIL-HAND-300) from Program Office.

Controls:          DI-S-3606, DI-E-7026 to 7030, MIL-STD-965.

Outputs:           Quantitative Supportability Constraints.

Mechanisms:        Contractor (Logistics Engineer).

**LSA Subtask 202.2.2 – Provide Supportability Factors.** In this subtask logistics engineers provide supportability, cost, and readiness related information to mission hardware and software standardization efforts in this subtask. Quantitative Supportability Constraints and Available Resources are the outputs.
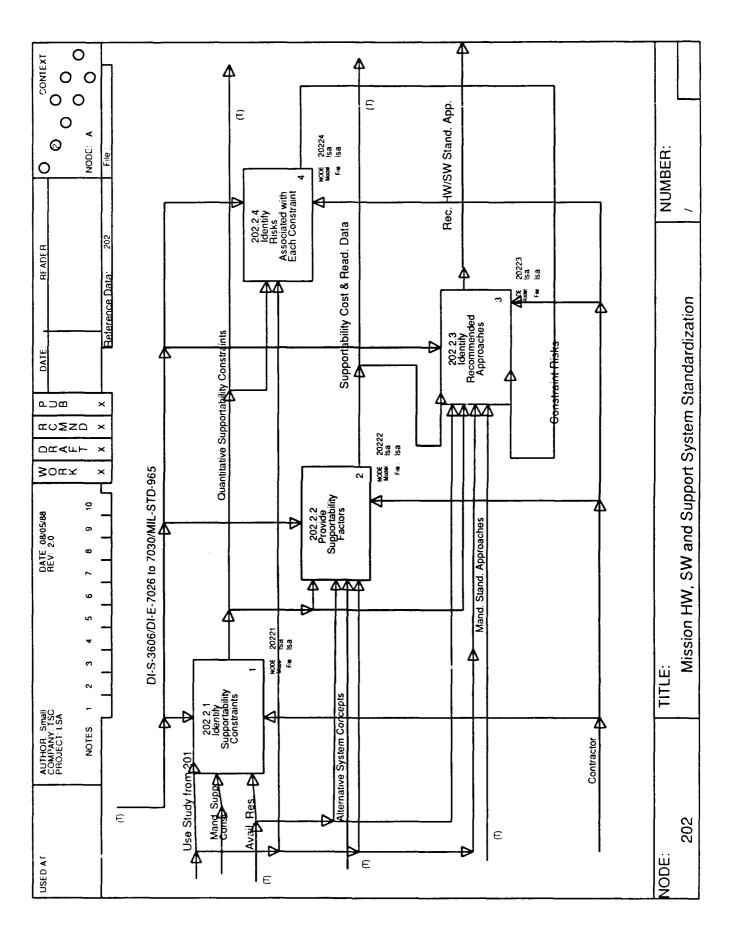
**Summary of Subtask 202.2.2 ICOMS:**

Inputs:            Quantitative Supportability Constraints from Subtask 202.2.1, Available Resources, Alternative System Concepts, Use Study from Task 201.

AUTHOR: Small
COMPANY: TSC
PROJECT: I SA

DATE: 08/05/88
REV: 2.0

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|---|---|---|
| WORK | x | |
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| PUB | x | |

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DATE:

CONTEXT:

NODE: A

Reference Data: 202

File:

DI-S-3606/DI-E-7026 to 7030/MIL-STD-965

Use Study from 201

Mand. Supp. Const.

Avail. Res.

Alternative System Concepts

Quantitative Supportability Constraints

202.2.1
Identify
Supportability
Constraints
1

NODE 20221
Model Isa
File Isa

202.2.2
Provide
Supportability
Factors
2

NODE 20222
Model Isa
File Isa

202.2.4
Identify
Risks
Associated with
Each Constraint
4

NODE 20224
Model Isa
File Isa

202.2.3
Identify
Recommended
Approaches
3

NODE 20223
Model Isa
File Isa

Supportability Cost & Read. Data

Mand. Stand. Approaches

Constraint Risks

Rec. HW/SW Stand. App.

Contractor

NODE: 202

TITLE: Mission HW, SW and Support System Standardization

NUMBER: /

A-36

Controls:        DI-S-3606, DI-E-7026 to 7030, MIL-STD-965.
Outputs:         Supportability Cost and Readiness Data.
Mechanisms:      Contractor (Logistics Engineer).

**LSA Subtask 202.2.3 - Identify Recommended Approaches.** In this subtask logistics engineers identify recommended mission hardware and software standardization approaches which have utility due to cost, readiness, or supportability considerations and participate in the system/equipment standardization effort. Knowledge of available resources, standardization requirements, and defined risks are necessary to complete this task.

**Summary of Subtask 202.2.3 ICOMS:**

Inputs:          Available Resources, Mandatory Standardization Approaches (e.g. Parts Ctl., Test Equipment, Avionics, MATE, PCP) Constraint Risks from Subtask 202.2.4, Use Study from Task 201, Supportability Cost and Readiness Data from Subtask 202.2.2.
Controls:        DI-S-3606, DI-E-7026 to 7030, MIL-STD-965.
Outputs:         Recommended Hardware/Software Standardization Approaches.
Mechanisms:      Contractor (Logistics Engineer).

**LSA Subtask 202.2.4 - Identify Risks Associated with each Constraint.** In this subtask a logistics engineers identify any risks associated with each constraint identified in Task 202.2.1. For example, known or projected scarcities, and developmental logistic support resources are possible risk areas when establishing standardization constraints.

**Summary of Subtask 202.2.4 ICOMS:**

Inputs:          Quantitative Supportability Constraints from Subtask 202.2.1, Use Study from Subtask 201.
Controls:        DI-S-3606, DI-E-7026 to 7030, MIL-STD-965.
Outputs:         Constraint Risks.
Mechanisms:      Contractor (Logistics Engineer).
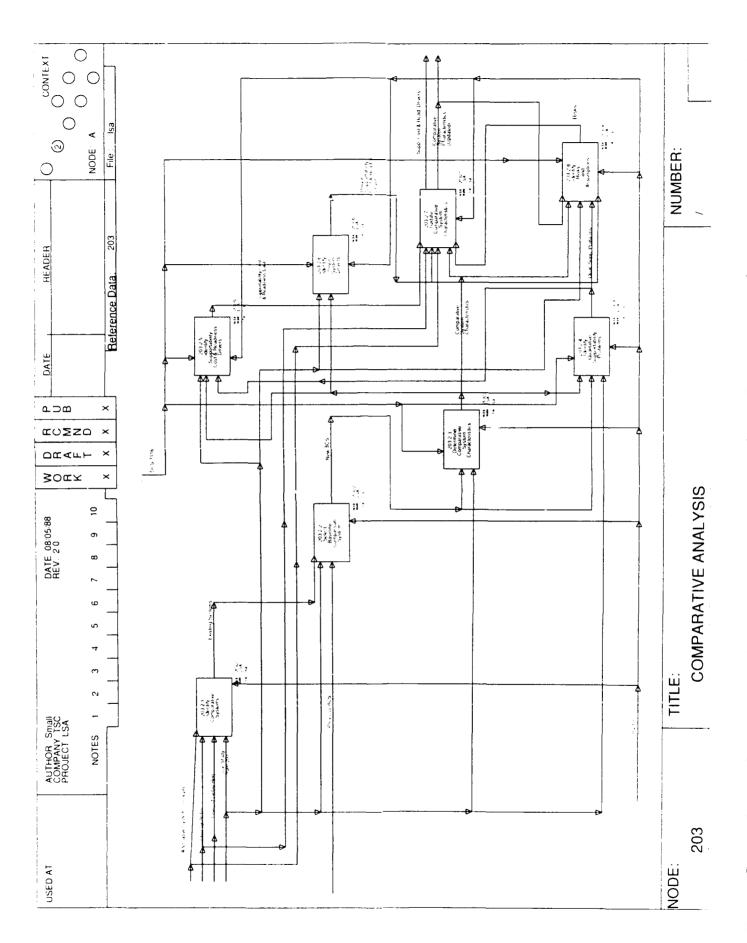
### A.7.3   LSA Task 203 - Comparative Analysis - IDEF$_0$ Node 203

Node 203 on page A-38 presents the tasks involved in establishing the supportability characteristics and cost and readiness drivers of new system/equipment. Engineers identify other comparable systems/equipment, establish their characteristics, and determine any differences. To perform this analysis engineers look at the Use Study, other systems and their characteristics, and new systems/equipment and their characteristics. The eight subtasks are identified and discussed below.

**LSA Subtask 203.2.1 - Identify Comparative Systems -** In this subtask engineers identify existing systems and subsystems (hardware, operational and support) for comparison with new system/equipment alternatives.

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AUTHOR: Small
COMPANY: TSC
PROJECT: LSA

DATE 08/05/88
REV. 2.0

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| WORK | DRAFT | RECMND | PUB |
|---|---|---|---|
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| | x | x | |

READER | DATE

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Reference Data 203

CONTEXT

②

NODE: A    File: lsa

203.2.1 Identify Comparative Systems

203.2.2 Select Baseline Comparative System

203.2.3 Determine Comparative System Characteristics

203.2.5 Identify Supportability Cost & Readiness Drivers

203.2.6 Identify Risk System Drivers

203.2.7 Update Comparative System Characteristics

203.2.4 Identify Candidate Supportability Problems

203.2.8 Verify Risks and Assumptions

TITLE: COMPARATIVE ANALYSIS

NODE: 203

NUMBER:

**Summary of Subtask 203.2.1 ICOMS:**

Inputs: Alternative System Concepts, Current Systems, Level of Detail Required from SON, Use Study from Task 201.

Controls:

Outputs: Existing Systems.

Mechanisms: Contractor (Engineer).

**LSA Subtask 203.2.2 – Select Baseline Comparison System.** In this subtask engineers select or develop a Baseline Comparison System (BCS) for use in comparative analyses and identifies supportability, cost, and readiness drivers of each significantly different new system/equipment alternative. A BCS is developed using a composite of elements from different existing systems. The composite represents the design, operation, and support characteristics of a new system/equipment alternative as closely as possible. Different BCSs or composites may be developed to compare different parameters of interest. Previously developed BCSs are assessed to determine the extent to which they can fill the need for the new system/equipment.

**Summary of Subtask 203.2.2 ICOMS:**

Inputs: Existing Systems from Subtask 203.2.1, Use study from Task 201, Previous Baseline Comparison Systems.

Controls:

Outputs: New BCSs

Mechanisms: Contractor (Engineer).

**LSA Subtask 203.2.3 – Determine Comparative System Characteristics.** In this subtask operations and support costs, logistic support resource requirements, reliability and maintainability (R&M) values, and readiness values of the comparative systems are identified. These values are identified at the system and subsystem level for each BCS established. Values are adjusted to account for differences between the comparative system's use profile and the new system/equipment's use profile where appropriate.

**Summary of Subtask 203.2.3 ICOMS:**

Inputs: New BCS from Subtask 203.2.2, Use Study from Task 201.

Controls: DI-S-7116.

Outputs: Comparative System Characteristics.

Mechanisms: Contractor (Engineer).

**LSA Subtask 203.2.4 – Identify Qualitative Supportability Problems.** In this subtask qualitative supportability problems on comparative systems which should be prevented on the new system/equipment are identified. Outputs from other 200 series tasks are required for this task.

**Summary of Subtask 203.2.4 ICOMS:**

Inputs: Comparative System Characteristics from Subtask 203.2.3, New BCS from Subtask 203.2.2, Use Study from Task 201.

Controls:         DI–S–7116.

Outputs:        Qualitative Supportability Problems.

Mechanisms:   Contractor (Engineer).

**LSA Subtask 203.2.5 – Identify Supportability, Cost, and Readiness Drivers.** In this subtask engineers determine the supportability, cost, and readiness drivers of each comparative system or BCS. These drivers may come from the design, operating or support characteristics of the comparative systems and represent drivers for the new system/ equipment. For example, repair cycle time may be the prime readiness driver, a particular hardware subsystem may be the prime manpower driver, or energy may be the prime cost driver.

**Summary of Subtask 203.2.5 ICOMS:**

Inputs:         Use Study from Task 201, Comparative System Characteristics from Subtask 203.2.3, Qualitative Supportability Problems from Subtask 203.2.4.

Controls:       DI–S–7116.

Outputs:      Supportability Cost and Readiness Drivers.

Mechanisms   Contractor (Engineer)

**LSA Subtask 203.2.6 – Identify Unique System Drivers.** In this subtask any supportability, cost or readiness drivers for the new system/equipment resulting from subsystems or equipment in the new system for which there are no comparable subsystems or equipment in comparative systems are identified and documented.

**Summary of Subtask 203.2.6 ICOMS:**

Inputs:         Use Study from Task 201, Comparative System Characteristics from Subtask 203.2.3.

Controls:       DI–S–7116.

Outputs:      Unique Supportability Cost and Readiness Drivers.

Mechanisms:   Contractor (Engineer).

**LSA Subtask 203.2.7 – Update Comparative System Characteristics.** In this subtask when new data becomes available, for example, New Alternate System Concepts, New Comparative System Concepts, an engineer updates the comparative systems, their associated parameters, and the supportability, cost, and readiness drivers.

**Summary of Subtask 203.2.7 ICOMS:**

Inputs:         Supportability Cost and Readiness Data from Subtask 203.2.5, Current Systems, Unique Supportability Cost and Readiness Drivers from Subtask 203.2.6, Alternative System Concepts, Comparative System Characteristics from Subtask 203.2.3, Risks from Subtask 203.2.8.

Controls:

Outputs: Supportability Cost and Readiness Drivers, Comparative System Characteristics (Updated).

Mechanisms: Contractor (Engineer).

**LSA Subtask 203.2.8 - Identify Risks and Assumptions.** This subtask identifies and documents any risks and assumptions associated with the comparative systems, and their associated parameters and drivers, such as low degree of similarity between the new system/equipment and existing systems or the lack of accurate data on existing systems. All of the other outputs within this node are input used by the Contractor to determine these risks.

**Summary of Subtask 203.2.8 ICOMS:**

Inputs: Comparative System Characteristics from Subtask 203.2.3, Updated Comparative System Characteristics from Subtask 203.2.7, Use Study from Task 201, Qualitative Supportability Problems from Subtask 203.2.4, Unique Supportability Cost and Readiness Drivers from Subtask 203.2.6, Supportability Cost and Readiness Data from Subtask 203.2.5.

Controls: DI-S-7116.

Outputs: Risks.

Mechanisms: Contractor (Engineer).

**A.7.4 LSA Task 204 - Technological Opportunities - IDEF$_0$ Node 204**

Node 204 on page A-42 presents the tasks involved in determining availability of new technology. To determine the recommended design objectives, engineers review the outputs from analyses performed in Task 203. The three subtasks are identified and discussed below.

**LSA Subtask 204.2.1 - Recommended Design Objectives.** In this subtask the design engineer and the logistics engineer establish design technology approaches to achieve supportability improvements on the new system/equipment over existing systems and subsystems. All of the inputs listed below are required to produce the Recommended Design Objectives.

**Summary of Subtask 204.2.1 ICOMS:**

Inputs: Supportability Cost and Readiness Drivers from Task 203, State-of-the-Art Design Approaches, Technological Evaluations and Improvements, Qualitative Supportability Problems from Task 203.
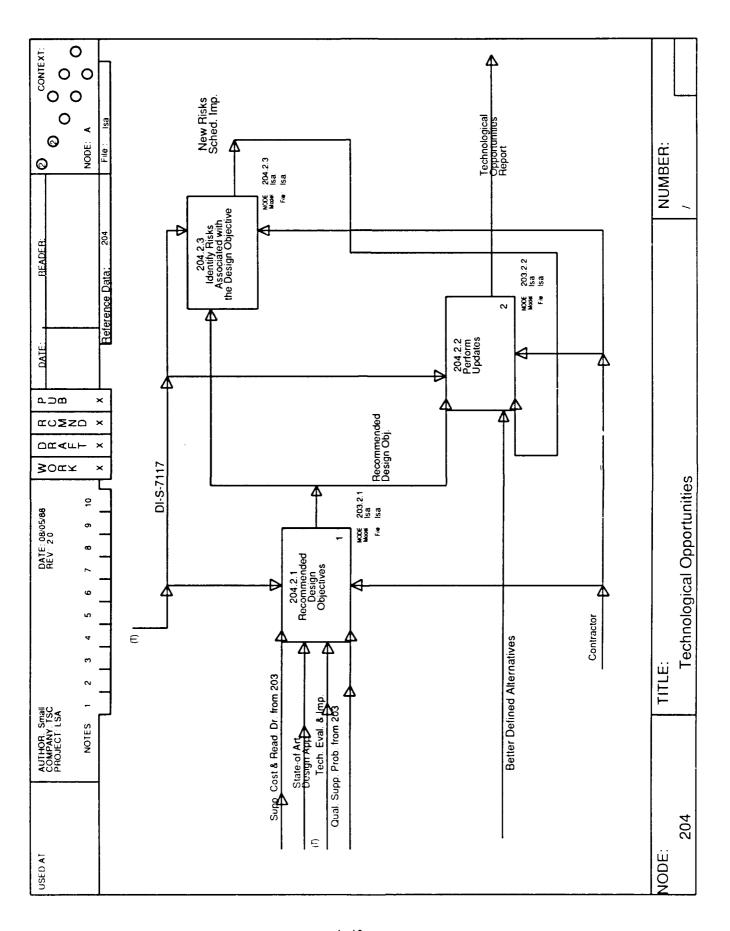
Controls: DI-S-7117

Outputs: Recommended Design Objectives.

Mechanisms: Contractor (Engineer).

AUTHOR: Small
COMPANY: TSC
PROJECT: LSA

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CONTEXT:

NODE: A    File: Isa

Reference Data: 204

DI-S-7117

(T)

Supp. Cost & Read. Dr. from 203

State of Art
Design Appl.

Tech. Eval. & Imp.

Qual. Supp. Prob. from 203

(T)

Better Defined Alternatives

Contractor

**204.2.1**
Recommended
Design
Objectives
1

NODE
Model
File

203.2.1
Isa
Isa

Recommended
Design Obj.

New Risks
Sched. Imp.

**204.2.3**
Identify Risks
Associated with
the Design Objecive

NODE
Model
File

204.2.3
Isa
Isa

**204.2.2**
Perform
Updates
2

NODE
Model
File

203.2.2
Isa
Isa

Technological
Opportunities
Report

NODE: 204    TITLE: Technological Opportunities    NUMBER:

A-42

**LSA Subtask 204.2.2 – Perform Updates.** In this subtask the engineer updates the Technological Opportunities Report as new information is made available, or system/equipment alternatives are better defined.

**Summary of Subtask 204.2.2 ICOMS:**

| | |
|---|---|
| Inputs: | Recommended Design Objectives from Subtask 204.2.1, New Risks and Scheduled Improvements from Subtask 204.2.3, Better Defined Alternatives from Labs, Aircraft System Division (ASD), Electronic System Division (ESD), AFCOLR. |
| Controls: | DI-S-7117. |
| Outputs: | Technological Opportunities Report. |
| Mechanisms: | Contractor (Engineer). |

**LSA Subtask 204.2.3 – Identify Risks Associated with Design Objectives.** In this subtask, the engineer identifies any risks associated with the design objectives established, looks at the development and evaluation approaches needed to verify the improvement potential, and determines the cost or schedule impacts to implement the potential improvements.

**Summary of Subtask 204.2.3 ICOMS:**

| | |
|---|---|
| Inputs: | Recommended Design Objectives from Subtask 204.2.1. |
| Controls: | DI-S-7117. |
| Outputs: | New Risks and Scheduled Improvements. |
| Mechanisms: | Contractor (Engineer). |
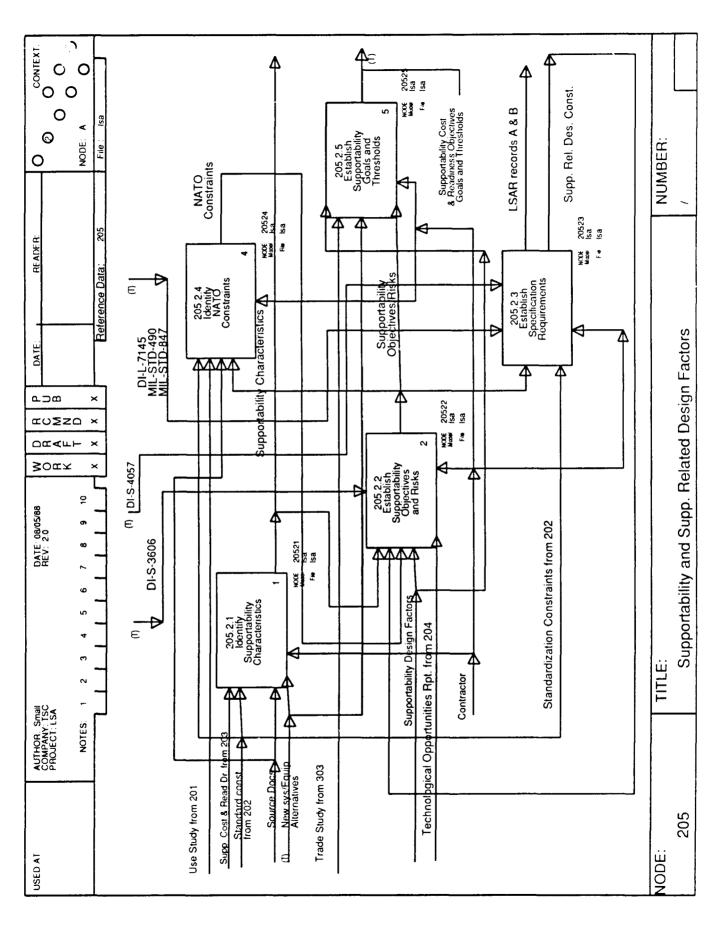
**A.7.5 LSA Task 205 – Supportability and Supportability Related Design Factors – IDEF$_0$ Node 205**

Node 205 on page A-44 presents the tasks required to complete the analysis of supportability and supportability design factors. This is the final task in the series and incorporates the outputs of all the other 200 series tasks. The input is primarily from the 200 series tasks (Supportability Costs and Readiness Drivers, Standardization Constraints, Use Study) and is used to develop Supportability Cost and Readiness Objectives, Goals, and Thresholds. The results of this task can have a major impact on design. The five subtasks are identified and discussed below.

**LSA Subtask 205.2.1 – Identify Supportability Characteristics.** In this subtask the Contractor identifies the quantitative supportability characteristics resulting from the alternative design and operational concepts for the new system/equipment. Supportability characteristics are expressed in terms of feasible support concepts, R&M parameters, system readiness, O&S costs, and logistics support resource requirements. Both peacetime and wartime conditions are included. Identification of any hardware or software for which the Government will not or may not have full design rights is necessary. Alternatives and cost, schedule, and function impacts are included.

USED AT:

AUTHOR: Small
COMPANY: TSC
PROJECT: LSA

DATE: 08/05/88
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CONTEXT:

NODE: A

Reference Data: 205

File: Isa

Use Study from 201

Supp. Cost & Read Dr. from 203

Standard const. from 202

Source Docs

(T) New sys/Equip Alternatives

Trade Study from 303

DI-S-3606

(T) DI-S-4057

DIL-7145
MIL-STD-490
MIL-STD-847

NATO Constraints

Supportability Characteristics

205.2.1
Identify
Supportability
Characteristics
1
NODE 20521
Model Isa
File Isa

205.2.2
Establish
Supportability
Objectives
and Risks
2
NODE 20522
Model Isa
File Isa

205.2.4
Identify
NATO
Constraints
4
NODE 20524
Model Isa
File Isa

205.2.5
Establish
Supportability
Goals and
Thresholds
5
NODE 2052
Model Isa
File Isa

205.2.3
Establish
Specification
Requirements
NODE 20523
Model Isa
File Isa

Supportability
Objectives Risks

Supportability Design Factors

Contractor

Technological Opportunities Rpt. from 204

Standardization Constraints from 202

Supportability Cost
& Readiness Objectives
Goals and Thresholds

LSAR records A & B

Supp. Rel. Des. Const.

NODE: 205

TITLE: Supportability and Supp. Related Design Factors

NUMBER:

**Summary of Subtask 205.2.1 ICOMS:**

| | |
|---|---|
| Inputs: | Supportability Cost and Readiness Drivers from Task 203, Standardization Constraints from Task 202, Source Documents (System Spec, PMD), New System/Equipment Alternatives. |
| Controls: | |
| Outputs: | Supportability Characteristics. |
| Mechanisms: | Contractor (Engineer). |

**LSA Subtask 205.2.2 – Establish Supportability Objectives and Risks.** In this subtask engineers establish supportability, cost and readiness objectives, and risks for the new system. All the inputs listed below are needed.

**Summary of Subtask 205.2.2 ICOMS:**

| | |
|---|---|
| Inputs: | Supportability Characteristics from Subtask 205.2.1, NATO Constraints from Subtask 205.2.4, Supportability Related Design Constraints from Subtask 205.2.3, Supportability Design Factors, Technological Opportunities Report from Task 204. |
| Controls: | DI-S-3606. |
| Outputs: | Supportability Objectives/Risks. |
| Mechanisms: | Contractor (Engineer). |

**LSA Subtask 205.2.3 – Establish Specification Requirements.** In this subtask the Contractor establishes supportability and supportability related design constraints for the new system/equipment. These constraints are included in requirements documents or contracts, as appropriate. The constraints are documented in the LSAR or equivalent format approved by the requiring authority.

**Summary of Subtask 205.2.3 ICOMS:**

| | |
|---|---|
| Inputs: | Supportability Objectives/Risks from Subtask 205.2.2, Standardization Constraints from Task 202. |
| Controls: | DI-S-4057, MIL-STD-490. |
| Outputs: | LSAR Records A & B, Supportability Related Design Constraints. |
| Mechanisms: | Contractor |

**LSA Subtask 205.2.4 – Identify NATO Constraints.** In this subtask any constraints that preclude adoption of NATO systems/equipment to satisfy the mission need are identified. The primary input to this task is the Use Study, supplemented by Source Documents, Supportability Objectives/Risks, and Standardization Constraints.

**Summary of Subtask 205.2.4 ICOMS:**

| | |
|---|---|
| Inputs: | Standardization Constraints from Task 202, Supportability Objectives/Risks from Subtask 205.2.2, Use Study from Task 202, Source Documents. |

Controls:

Outputs: NATO Constraints.

Mechanisms: Contractor (Engineer).

**LSA Subtask 205.2.5 – Establish Supportability Goals and Thresholds.** In this subtask the Contractor updates the supportability, cost, and readiness objectives. The Contractor also establishes supportability, cost, readiness goals, and thresholds as new system/equipment alternatives become better defined.

### Summary of Subtask 205.2.5 ICOMS:

Inputs: Supportability Design Factors, New System/Equipment Alternatives, Supportability Objectives/Risks from Subtask 205.2.2, Trade Study from Task 303.

Controls:

Outputs: Supportability Cost and Readiness Objectives Goals and Thresholds.

Mechanisms: Contractor (Engineer).

## A.8 LSA TASK 300 SERIES – PREPARATION AND EVALUATION OF ALTERNATIVES – IDEF$_0$ NODE 300
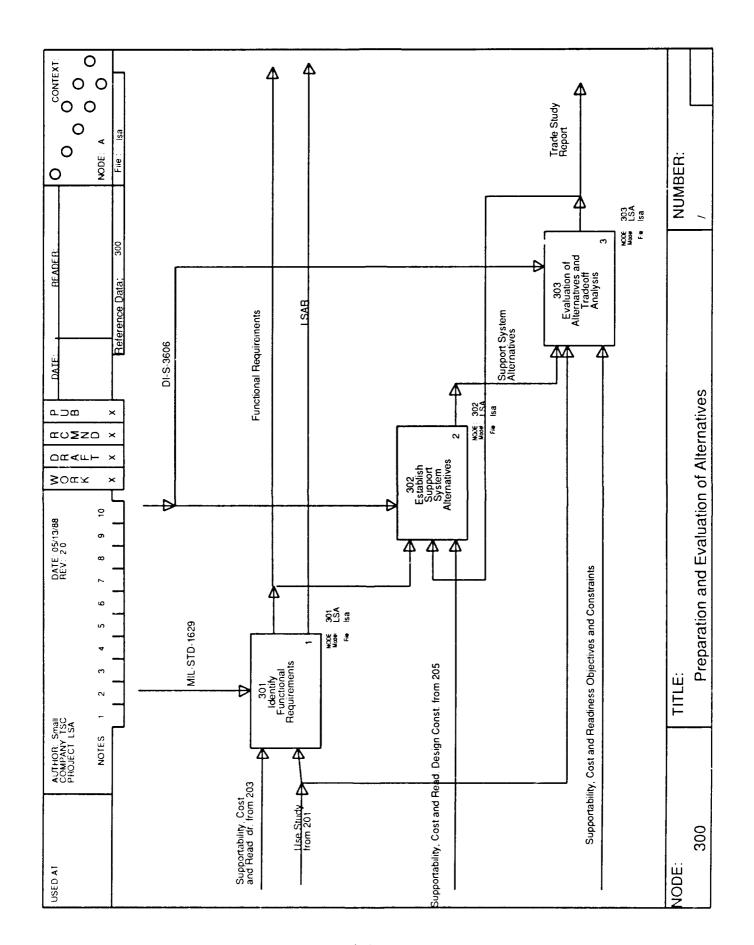
Node 300 on page A-47 presents the activities associated with the preparation and evaluation of alternatives. The purpose of this task series is to establish the requirements of the weapon system, to determine alternatives, to conduct tradeoff analyses, and to recommend the optimal alternative. The inputs to this task are identified in the analyses performed in the 200 series tasks (Use Study, Supportability Cost and Readiness Drivers, Objectives, Constraints and Design Constraints). The principal output of this task is the Trade Study and Functional Requirements Reports. The LSAR B, B1, B2, and C records are initiated in this task series.

*LSA Task 301 – Functional Requirements Identification*

The Functional Requirements Identification Task identifies the operations and support functions that must be performed for each system alternative. Task 301 then identifies the tasks that must be performed to operate and maintain each system in its intended environment.

The functional requirements identified and the risks involved in meeting the functional requirements are included in the Concept Formulation Package (CFP) and the System Concept Paper (SCP). Detailed operations and maintenance task identification and the formulation of design alternatives are generally included in the Required Operational Capability (ROC), Integrated Program Summary (IPS), and Decision Coordinating Paper (DCP).

Task 301 is generally initiated in Concept Exploration Phase. Subtasks 301.2.4 (Operations and Maintenance Tasks) and 301.2.5 (Design Alternatives) may be deferred to Dem-

Preparation and Evaluation of Alternatives

NODE: 300

A-47

onstration/Validation phase. Applicable subtasks are updated during Full Scale Development. During Production, Task 301 is only applicable to design changes.

The requiring authority is responsible for all applicable subtasks during Concept Exploration Phase. The implementing authority assumes responsibility for this task during Demonstration/Validation and subsequent acquisition phases.

**Summary of Task 301 ICOMS:**

| | |
|---|---|
| Inputs: | Supportability Cost and Readiness Drivers from Task 203, Use Study from Task 201. |
| Controls: | MIL-STD-1629. |
| Outputs: | Functional Requirements, LSAR. |
| Mechanisms: | Contractor. |

*LSA Task 302 – Support System Alternatives*

This task establishes support system alternatives for evaluation and tradeoff analysis, and determines the best system to be developed. These alternative support system concepts/plans and associated risks are addressed in the CFP and the SCP. As tradeoffs are made, support system alternatives are refined and updated for inclusion in the ROC, IPS and DCP. Subtasks that establish support system alternatives and risks are required during the Concept Exploration Phase. Subtasks which provide for alternative support plans and updates are generally applicable in Full Scale Development. During the Concept Exploration Phase, the requiring authority is responsible for all applicable subtasks of Task 302. During Demonstration/Validation and subsequent phases, the implementing authority is responsible for all applicable subtasks and required updates. All subtasks are performed by the Contractor.

**Summary of Task 302 ICOMS:**

| | |
|---|---|
| Inputs: | Supportability Cost and Readiness Design Constraints from Task 205, Functional Requirements from Task 301, Trade Study Report from Task 303. |
| Controls: | DI-S-3606. |
| Outputs: | Support System Alternatives. |
| Mechanisms: | Contractor. |

*LSA Task 303 – Evaluation of Alternatives and Tradeoff Analysis*

The purpose of this task is twofold: to determine the preferred support system alternative(s) and their associated risks for each proposed system; and to determine, through tradeoff analysis, the approach that provides the best balance between risk, cost, schedule, performance, readiness and support.

Logistic influence on design is achieved by including early tradeoff analysis results in requirement documents such as the Letter of Agreement (LOA) and CFP, program docu-

A-48

ments such as the ILSP, and subsequently into the decision documents (IPS and DCP). Results of later tradeoff analyses are incorporated in the ROC and development specification.

Task 303 is generally initiated during the Concept Exploration Phase, with the exception of Subtask 303.2.7 (Repair Level Analysis) which is applicable during Demonstration/ Validation. Both system and support system tradeoffs continue to be iterated through Full Scale Development; other key tradeoffs are selectively applied during Full Scale Development.

The requiring authority is responsible for all applicable subtasks during the Concept Evaluation Phase. The implementing authority assumes responsibility for all subtasks during Demonstration/Validation and, as applicable, during subsequent phases.

**Summary of Task 303 ICOMS:**

| | |
|---|---|
| Inputs: | Support System Alternatives from Task 302, Supportability Cost and Readiness Objectives and Constraints, Use Study from Task 201. |
| Controls: | DI-S-3606. |
| Outputs: | Trade Study Report. |
| Mechanisms: | Contractor. |

### A.8.1 LSA Task 301 – Identify Functional Requirements – IDEF$_0$ Node 301

Node 301 on page A-50 presents the activities necessary to identify the operations and support functions that must be performed for each system/equipment alternative under consideration. The Contractor uses the Use Study, Supportability Cost and Readiness Drivers and Alternative System Concepts to determine the Functional Requirements and to identify tasks that must be performed to operate and maintain the new system/equipment in its intended environment. Within Task 301 there are six subtasks that are identified and discussed below.

**LSA Subtask 301.2.1 – Identify Functional Requirements.** In this subtask the Contractor identifies and documents the functions that must be performed so that the new system/ equipment can be operated and maintained in its intended operational environment for each alternative under consideration. These functions are identified to a level commensurate with design and operational scenario development, and include both peacetime and wartime functions.

**Summary of Subtask 301.2.1 ICOMS:**
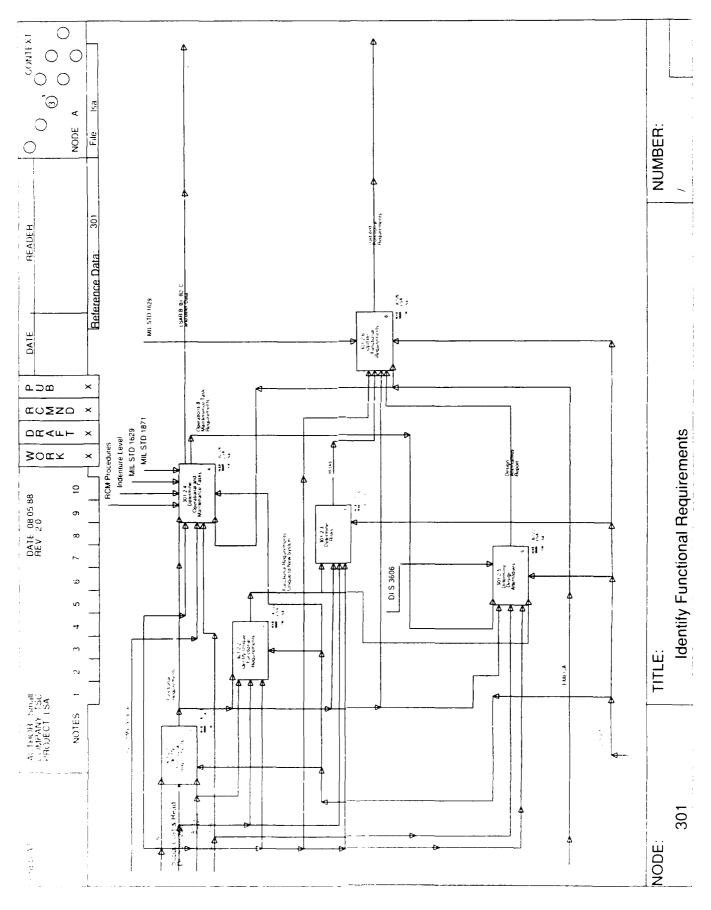
| | |
|---|---|
| Inputs: | Use Study from Task 201, Supportability Cost and Readiness Drivers from Task 203, Alternative System Concepts. |
| Controls: | |
| Outputs: | Functional Requirements. |

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| WORK | DRAFT | READER | DATE | CONTEXT |
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NODE A

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DATE

Reference Data: 301

File: Isa

MIL STD 1629

LSAR B B1 B2 C
and Other Data

MIL STD 1629
MIL STD 1871
Indenture Level
RCM Procedures

System
Requirements

Operations &
Maintenance Task
Requirements

301.2.6
Identify
Functional
Requirements

301.2.4
Determine
Operational and
Maintenance Tasks

301.2.1
Determine
Tasks

Design
Alternatives
Report

Functional Requirements
Unique to New System

301.2.2
Identify Unique
Functional
Requirements

DI S 3606

301.2.5
Determine
Design
Alternatives

Functional
Requirements

NODE: 301

TITLE: Identify Functional Requirements

NUMBER:

A-50

Mechanisms: Contractor (Engineer).

**LSA Subtask 301.2.2 – Identify Unique Functional Requirements.** In this subtask the Contractor identifies those functional requirements that are unique to the new system/ equipment as a result of new design technology or operational concepts, or that are supportability, cost, or readiness drivers.

**Summary of Task 301.2.2 ICOMS:**

| | |
|---|---|
| Inputs: | Alternative System Concepts, Supportability Cost and Readiness Drivers from Task 203, Use Study from Task 201, Functional Requirements from Subtask 301.2.1. |
| Controls: | |
| Outputs: | Functional Requirements Unique to the New System. |
| Mechanisms: | Contractor (Engineer). |

**LSA Subtask 301.2.3 – Determine Risks.** In this subtask the Contractor identifies any risks involved in satisfying the functional requirements of the new system/equipment.

**Summary of Task 301.2.3 ICOMS:**

| | |
|---|---|
| Inputs: | Functional Requirements Unique to the New System from Subtask 301.2.2, Functional Requirements from Subtask 301.2.1, Use Study from Task 201, Supportability Cost and Readiness Drivers from Task 203. |
| Controls: | |
| Outputs: | Risks. |
| Mechanisms: | Contractor (Engineer). |

**LSA Subtask 301.2.4 – Determine Operations and Maintenance Tasks.** In this subtask the Contractor identifies the operations and maintenance tasks for the new system/equipment based on the identified functional requirements. Tasks relating to functions that require logistic support resources are identified. Preventive maintenance, corrective maintenance, operations, and other support tasks such as preparation for operation, operation, post-operation, calibration and transportation are identified. Many of the ILS functions are integrated in this subtask.

**Summary of Subtask 301.2.4 ICOMS:**

| | |
|---|---|
| Inputs: | Functional Requirements from Task 201, Level of Maintenance from PSOC, Use Study from Task 201, FMECA, Documentation Required from SOW. |
| Controls: | RCM Procedures, Indenture Level from SOW, MIL-STD-1629, MIL-STD-1871. |
| Outputs: | Operations and Maintenance Task Report, LSAR Records B, B1, B2, C or Other Data. |

Mechanisms:     Contractor (Engineer).

**LSA Subtask 301.2.5 – Determine Design Alternatives.**  In this subtask the Contractor formulates design alternatives to correct design deficiencies uncovered during the identification of functional requirements or operations and maintenance task requirements.  Design alternatives that reduce or simplify functions requiring logistic support resources are analyzed.

**Summary of Subtask 301.2.5 ICOMS:**

| | |
|---|---|
| Inputs: | Operations and Maintenance Task Report from Subtask 301.2.4, Use Study from Task 201, Functional Requirements from Subtask 301.2.1, Functional Requirements Unique to New System, Documentation Required from SOW. |
| Controls: | DI-S-3606. |
| Outputs: | Design Alternatives Report. |
| Mechanisms: | Contractor (Engineer). |

**LSA Subtask 301.2.6 – Update Functional Requirements.**  In this subtask the Contractor updates the functional requirements, operations, and maintenance task requirements as the new system/equipment is better defined and more accurate data made available.

| | |
|---|---|
| Inputs: | Functional Requirements from Subtask 301.2.1, Use Study from Task 201, Risks from Subtask 301.2.3, Design Alternatives Report from Subtask 301.2.5, FMECA. |
| Controls: | MIL-STD-1629. |
| Outputs: | Updated Functional Requirements. |
| Mechanisms: | Contractor (Engineer). |
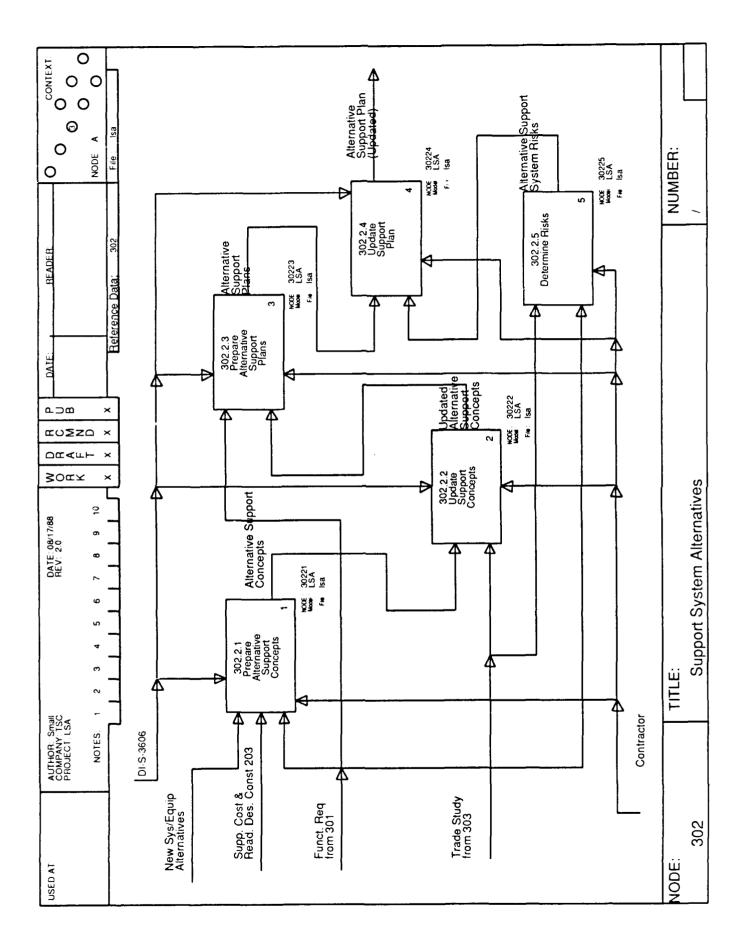
**A.8.2   LSA Task 302 – Support System Alternatives – IDEF$_0$ Node 302**

Node 302 on page A-53 presents the activities necessary to establish viable support system alternatives for the new system/equipment.  The alternatives are be subject to evaluation and tradeoff analysis, and will result in the determination of the best system for development.  Within Task 302 there are five major subtasks that are identified and discussed below.

**LSA Subtask 302.2.1 – Prepare Alternative Support Concepts.**  In this subtask the Contractor develops and documents viable alternative system level support concepts for the new system/equipment alternatives.  These alternative support concepts satisfy the functional requirements of the new system/equipment.  Each alternative support concept is developed to a level of detail commensurate with the hardware, software and operational concept development, and addresses all elements of ILS.  The same support concept is applicable to multiple new system/equipment designs and operational alternatives.  The range of support alternatives considered is not restricted to existing standard support concepts, but includes identification of innovative concepts that can improve system readi-

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AUTHOR: Small
COMPANY: TSC
PROJECT: LSA

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File: lsa

Reference Data: 302

DI-S-3606

New Sys/Equip Alternatives

Supp. Cost & Read. Des. Const 203

Funct. Req from 301

Trade Study from 303

Contractor

302.2.1 Prepare Alternative Support Concepts
1
NODE 30221
Model LSA
File lsa

Alternative Support Concepts

302.2.2 Update Support Concepts
2
NODE 30222
Model LSA
File lsa

Updated Alternative Support Concepts

302.2.3 Prepare Alternative Support Plans
3
NODE 30223
Model LSA
File lsa

Alternative Support Plans

302.2.4 Update Support Plan
4
NODE 30224
Model LSA
File lsa

Alternative Support Plan (Updated)

302.2.5 Determine Risks
5
NODE 30225
Model LSA
File lsa

Alternative Support System Risks

NODE: 302

TITLE: Support System Alternatives

NUMBER:

A-53

ness, optimize manpower and personnel requirements, or reduce O&S costs. Contractor logistic support is considered in formulating alternative support concepts.

**Summary of Subtask 302.2.1 ICOMS:**

| | |
|---|---|
| Inputs: | Functional Requirements from Task 301, Supportability Cost and Readiness Design Constraints from Task 203, New System/Equipment Alternatives. |
| Controls: | DI-S-3606. |
| Outputs: | Alternative Support Concepts. |
| Mechanisms: | Contractor (Maintenance Planner). |

**LSA Subtask 302.2.2 – Updated Alternative Support Concepts.** In this subtask the Contractor updates the alternative support concepts as system tradeoffs are conducted and new system/equipment alternatives are better defined. Alternative support concepts are documented at the system and subsystem level, and address the supportability, cost, and readiness drivers, and the unique functional requirements of the new system/equipment.

**Summary of Subtask 302.2.2 ICOMS:**

| | |
|---|---|
| Inputs: | Alternative Support Concepts from Subtask 302.2.1, Trade Study from Task 303. |
| Controls: | DI-S-3606. |
| Outputs: | Updated Alternative Support Concepts. |
| Mechanisms: | Contractor (Maintenance Planner). |

**LSA Subtask 302.2.3 – Prepare Alternative Support Plans.** In this subtask the Contractor develops and documents viable alternative support plans for the new system/equipment to a level of detail commensurate with the hardware, software, and operational scenario development.

**Summary of Subtask 302.2.3 ICOMS:**

| | |
|---|---|
| Inputs: | Updated Alternative Support Concepts from Subtask 302.2.2, Functional Requirements from Task 301. |
| Controls: | DI-S-3606. |
| Outputs: | Alternative Support Plans. |
| Mechanisms: | Contractor (Maintenance Planner). |

**LSA Subtask 302.2.4 – Update Support Plan.** In this subtask the Contractor updates and refines the alternative support plans as tradeoffs are conducted and the new system/equipment design and operational scenario are better defined.

**Summary of Subtask 302.2.4 ICOMS:**

| | |
|---|---|
| Inputs: | Alternative Support Plans from Subtask 302.2.3, Alternative Support System Risks from Subtask 302.2.5. |

Controls:        DI–S–3606.
Outputs:         Updated Alternative Support Plan.
Mechanisms:      Contractor (Maintenance Planner).

**LSA Subtask 302.2.5 – Determine Risks.** In this subtask the Contractor identifies risks associated with each support system alternative formulated.

**Summary of Subtask 302.2.5 ICOMS:**

Inputs:          Trade Study from Task 303, Functional Requirements from Task 301.

Controls:

Outputs:         Alternative Support System Risks.
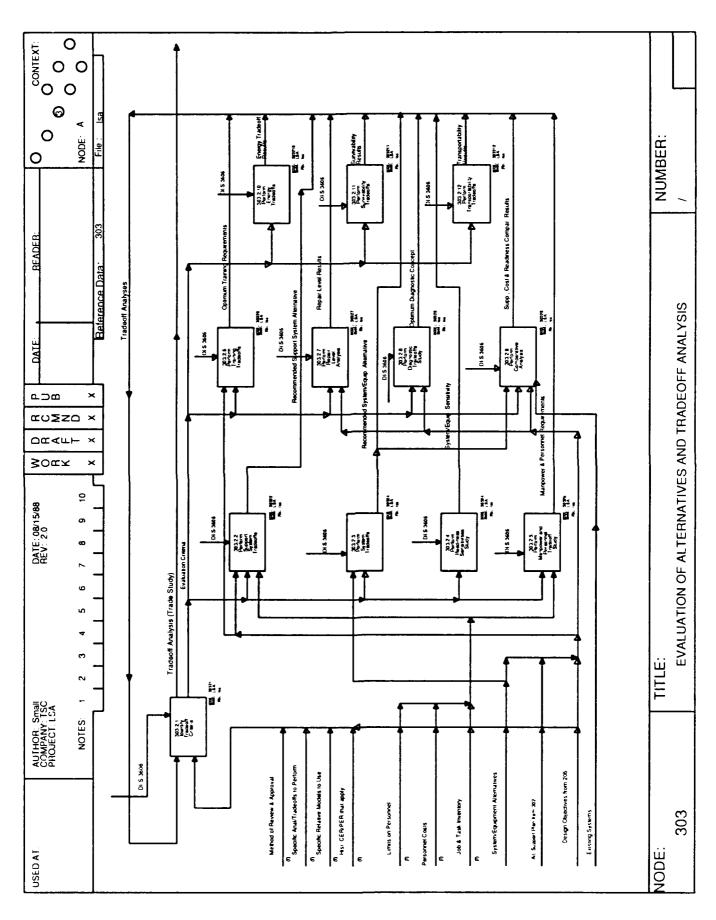
Mechanisms:      Contractor (Maintenance Planner).

**A.8.3  LSA Task 303 – Evaluation of Alternatives and Tradeoff Analysis – IDEF$_0$ Node 303**

Node 303 on page A-56 presents the activities necessary to determine the preferred support system alternative(s) for each system/equipment alternative. The model also lists the activities necessary to evaluate alternative system tradeoffs to determine the best approach to support design and operation. The optimal approach should represent the best balarce between cost, schedule, performance, readiness, and supportability. This task is an integrating task. Within Task 303 there are eleven major subtasks that are identified and discussed below.

**LSA Subtask Task 303.2.1 – Identify Tradeoff Criteria.** For each evaluation and tradeoff to be conducted under this subtask the Contractor undertakes the following activities:

- Identifies the qualitative and quantitative criteria that will be used to determine the best results. These criteria are related to the supportability, cost, and readiness requirements for the system/equipment.

- Selects or constructs analytical relationships or models between supportability, design, and operational parameters and those parameters identified for the evaluation criteria. In many cases the same model or relationship may be appropriate to perform a number of evaluations and tradeoffs. Parametric and cost estimating relationships (PER/CER) may be appropriate for use in formulating analytical relationships.

- Conducts the tradeoff or evaluation using established relationships and models and selects the best alternative(s) based upon the established criteria.

- Conducts appropriate sensitivity analyses on those variables which have a high degree of risk involved or which drive supportability, cost, or readiness for the new system.

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COMPANY: TSC
PROJECT: LSA

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| PUB | X | | |

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File: lsa

Reference Data: 303



Tradeoff Analyses

Tradeoff Analysis (Trade Study)

TITLE: EVALUATION OF ALTERNATIVES AND TRADEOFF ANALYSIS

NODE: 303

NUMBER:

- Documents the evaluation and tradeoff results including any risks and assumptions involved.

- Updates the evaluations and tradeoffs as the system/equipment is better defined and more accurate data becomes available.

- Includes both peacetime and wartime considerations in the analysis.

- Assesses the impact on existing or planned weapon, supply, maintenance, and transportation systems based on the tradeoff decision.

- Assesses life cycle support considerations to include post production support.

**Summary of Subtask 303.2.1 ICOMS:**

| | |
|---|---|
| Inputs: | Method of Review And Approval, Specific Analysis/Tradeoffs to Perform from 102, Specific Relative Models to Use, Historic CER/PER that apply, Limits on Personnel, Personnel Costs, Job and Task Inventory, System/Equipment Alternatives, Alternative Support Plan from Task 302, Design Objectives from Task 205, Existing Systems. |
| Controls: | DI–S–3606. |
| Outputs: | Evaluation Criteria, Tradeoff Analysis (Trade Study). |
| Mechanisms: | Contractor (Maintenance Planner). |

**LSA Subtask 303.2.2 – Perform Support System Tradeoffs.** In this subtask the Contractor conducts evaluations and tradeoffs between the support system alternatives identified for each system/equipment alternative (Task 302). For the selected support system alternatives, new or critical logistic support resource requirements are identified and documented. Any restructured personnel job classifications are identified as a new resource.

**Summary of Subtask 303.2.2 ICOMS:**

| | |
|---|---|
| Inputs: | Evaluation Criteria from Subtask 303.2.1, System/Equipment Alternatives, Alternative Support Plan from Task 302, Design Objectives from Task 205, Limits on Personnel, Personnel Costs, Job and Task Inventory. |
| Controls: | DI–S–3606. |
| Outputs: | Recommended Support System Alternative. |
| Mechanisms: | Contractor (Life Cycle Cost Analyst). |

**LSA Subtask 303.2.3 – Perform System Tradeoffs.** In this subtask the engineer conducts evaluations and tradeoffs between design, operations, and support concepts under consideration to develop the recommended alternative.

**Summary of Subtask 303.2.3 ICOMS:**

| | |
|---|---|
| Inputs: | System/Equipment Alternatives, Evaluation Criteria from Subtask 303.2.1. |

Controls:        DI-S-3606.

Outputs:         Recommended System/Equipment Alternative.

Mechanisms:      Contractor (Engineer).

**LSA Subtask 303.2.4 – Perform Readiness Sensitivity Study.** In this subtask the engineer evaluates the sensitivity of system readiness parameters with variations in key design and such support parameters as Reliability and Maintainability, spares budgets, resupply time, and manpower and personnel skill availability.

**Summary of Subtask 303.2.4 ICOMS:**

Inputs:          Evaluation Criteria from Subtask 303.2.1.

Controls:        DI-S-3606.

Outputs:         System/Equipment Sensitivity.

Mechanisms:      Contractor (Engineer).

**LSA Subtask 303.2.5 – Perform Manpower and Personnel Tradeoff Studies.** In this subtask the Contractor estimates and evaluates the manpower and personnel implications of alternative system/equipment concepts in terms of total numbers of personnel required, job classifications, skill levels, and experience required. This analysis includes organizational overhead requirements, error rates, and training requirements.

**Summary of Subtask 303.2.5 ICOMS:**

Inputs:          Limits of Personnel, Personnel Costs, Job and Task Inventory, Evaluation Criteria from Subtask 303.2.1.

Controls:        DI-S-3606.

Outputs:         Manpower and Personnel Requirements.

Mechanisms:      LCC Analyst.

**LSA Subtask 303.2.6 – Perform Training Tradeoffs.** In this subtask the Contractor conducts evaluations and tradeoffs between design, operations, training, and personnel job design. This evaluation determines the optimum solution for attaining and maintaining the required proficiency of operating and support personnel. Training evaluations and tradeoffs are conducted, taking into account shifting of job duties between job classifications, alternative technical publications concepts, and alternative mixes of formal training, on-the-job training, unit training, and use of training simulators.

**Summary of Subtask 303.2.6 ICOMS:**

Inputs:          Evaluation Criteria from Subtask 303.2.1, Limits on Personnel, Personnel Costs, Job and Task Inventory.

Controls:        DI-S-3606.

Outputs:         Optimum Training Requirements.

Mechanisms:      Contractor (LCC Analyst).

**LSA Subtask 303.2.7 - Perform Repair Level Analysis.** In this subtask the Contractor conducts repair level analyses (RLA) commensurate with the level of design, operation, and support data available.

> **Summary of Subtask 303.2.7 ICOMS:**
>
> | | |
> |---|---|
> | Inputs: | Evaluation Criteria from Subtask 303.2.1, System/Equipment Alternatives, Alternative Support Plan from Task 302, Design Objectives from Task 205. |
> | Controls: | DI-S-3606. |
> | Outputs: | Repair Level Results. |
> | Mechanisms: | Cor--ictor (Engineer). |

**LSA Subtask 303.2.8 - Perform Diagnostic Tradeoff Studies.** In this subtask the Contractor evaluates alternative diagnostic concepts: varying degrees of built-in-test (BIT), off line test, manual testing, automatic testing, diagnostic connecting points for testing, and identifies the optimum diagnostic concept for each system/equipment alternative under consideration.

> **Summary of Subtask 303.2.8 ICOMS:**
>
> | | |
> |---|---|
> | Inputs: | Evaluation Criteria from Subtask 303.2.1, System/Equipment Alternatives, Alternative Support Plan from Task 302, Design Objectives from Task 205. |
> | Controls: | DI-S-3606. |
> | Outputs: | Optimum Diagnostic Concept. |
> | Mechanisms: | Contractor (Engineer). |

**LSA Subtask 303.2.9 - Perform Comparative Analysis.** In this subtask the Contractor conducts comparative evaluations between the supportability, cost, and readiness parameters of the new system/equipment. The Contractor also assesses the risks involved in achieving the supportability, cost, and readiness objectives for the new system/equipment based upon the degree of growth over existing systems/equipment.

> **Summary of Subtask 303.2.9 ICOMS:**
>
> | | |
> |---|---|
> | Inputs: | Recommended System/Equipment Alternative from Subtask 303.2.3, Evaluation Criteria from Subtask 303.2.1, System/Equipment Alternatives, Alternative Support Plan from Task 302, Design Objectives from Task 205, Existing Systems. |
> | Controls: | DI-S-3606. |
> | Outputs: | Supportability Cost and Readiness Comparison Results. |
> | Mechanisms: | Contractor (LCC Analyst). |

**LSA Subtask 303.2.10 - Perform Energy Tradeoffs.** In this subtask the Contractor conducts evaluations and tradeoffs between system/equipment alternatives and energy re-

quirements. The petroleum, oil, and lubricant (POL) requirements for each system equipment alternative under consideration are identified and sensitivity analyses conducted on POL costs.

Summary of Subtask 303.2.10 ICOMS:

| | |
|---|---|
| Inputs: | Evaluation Criteria from Subtask 303.2.1. |
| Controls: | DI-S-3606. |
| Outputs: | Energy Tradeoff Results. |
| Mechanisms: | Contractor (Engineer). |

**LSA Subtask 303.2.11 - Perform Survivability Tradeoffs.** In this subtask the Contractor conducts evaluations and tradeoffs between system/equipment alternatives, survivability, and battle damage repair characteristics in a combat environment.

**Summary of Subtask 303.2.11 ICOMS:**

| | |
|---|---|
| Inputs: | Evaluation Criteria from Subtask 303.2.1. |
| Controls: | DI-S-3606. |
| Outputs: | Survivability Results. |
| Mechanisms: | Contractor (Engineer). |

**LSA Subtask 303.2.12 - Perform Transportability Tradeoffs.** In this subtask the Contractor conducts evaluations and tradeoffs between system/equipment alternatives and transportability requirements. The transportability requirements for each alternative under consideration are identified.

**Summary of Subtask 303.2.11 ICOMS:**

| | |
|---|---|
| Inputs: | Evaluation Criteria from subtask 303.2.1. |
| Controls: | DI-S-3606. |
| Outputs: | Transportability Results. |
| Mechanisms: | Contractor (LCC Analyst). |
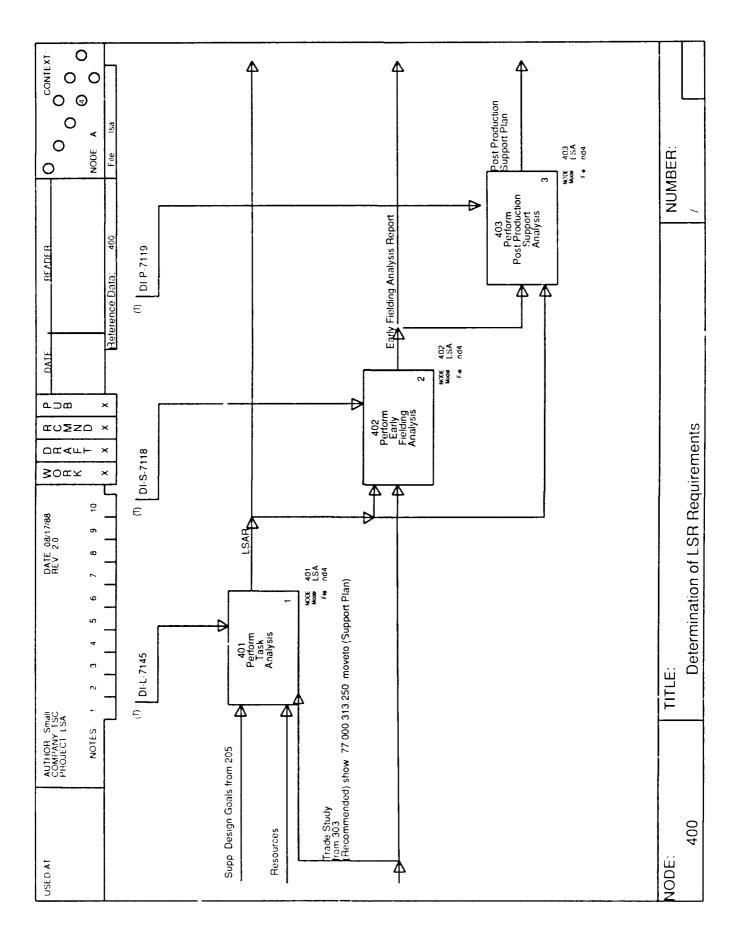
## A.9  LSA TASK 400 SERIES - DETERMINATION OF LOGISTIC SUPPORT REQUIREMENTS - IDEF$_0$ NODE 400

Node 400 on page A-61 presents the tasks necessary to determine logistic support requirements. The purpose of this task is to determine currently available and new support resources that will be required to support the new system/equipment in its production and post production phase.

*LSA Task 401 - Task Analysis*

Task 401 is designed to analyze required operations and maintenance tasks and includes the following activities: identify the logistic support resource requirements for each task; highlight resource requirements which are new or critical; define transportability require-

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AUTHOR: Small　　　　　DATE: 08/17/88
COMPANY: TSC　　　　 REV: 2.0
PROJECT: LSA

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(f) ☐ DI-S-7118

(f) ☐ DI-P-7119

Supp Design Goals from 205

Resources

Trade Study
from 303
(Recommended) show  77 000 313 250 moveto (Support Plan)

LSAR

Early Fielding Analysis Report

**401**
Perform
Task
Analysis
1

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Model LSA
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**402**
Perform
Early
Fielding
Analysis
2

NODE 402
Model LSA
F# nd4

Post Production
Support Plan

**403**
Perform
Post Production
Support
Analysis
3

NODE 403
Model LSA
F# nd4

NODE: 400

TITLE:　Determination of LSR Requirements

NUMBER: /

A-61

ments; identify any support requirements which exceed established goals, thresholds, or constraints; provide data to support recommended design alternatives to improve supportability or enhance readiness; and provide source data for the development of required ILS documents.

Task analysis, when properly interfaced with other system engineering disciplines and ILS functional element inputs, effectively integrates and translates these inputs into output products required for preparation of ILS documents.

The overall program schedule and the level of design and operation definition govern the timing and scope of the task analysis. There is a limited time period for making this a cost effective task. This time period begins with the availability of required input from design activities and extends only to that point that allows time for analysis results to be used to develop the necessary ILS documents and identify support resources. Selective application of this task during Demonstration/Validation is limited to the identification and documentation of new or critical resources. Task 401 is generally applicable during the Full Scale Development Phase and is the responsibility of the implementing authority.

### Summary of Task 401 ICOMS:

| | |
|---|---|
| Inputs: | Supportability Design Goals from Task 205, Resources, Trade Study from Task 303 (Recommended Support Plan). |
| Controls: | DI-L-7148. |
| Outputs: | LSAR. |
| Mechanisms: | Contractor. |

*LSA Task 402 – Early Fielding Analysis*

This task is designed to: assess the impact of new system introduction on existing systems; identify sources of manpower and personnel skills to meet the requirements of the new system; determine the impact of failure to obtain the necessary logistic support resources; and determine essential logistic support resource requirements for a combat environment. This analysis is designed to assure effective fielding of the new system with all required resources and is conducted during Full Scale Development.

The implementing authority has responsibility for Early Fielding Analysis during Full Scale Development. This analysis is coordinated with the requiring authority, and task results should be confirmed by the requiring authority.

### Summary of Task 402 ICOMS:

| | |
|---|---|
| Inputs: | Trade Study from Task 303 (Recommended Support Plan), LSAR. |
| Controls: | DI-S-7118. |
| Outputs: | Early Fielding Analysis Report. |
| Mechanisms: | Contractor. |

*LSA Task 403 – Post Production Support Analysis*

This task identifies any known or potential post production support problems prior to the closing of production lines; and develops plans for their early resolution so that effective support of the new system will continue throughout its life cycle. The Post Production Support Plan documents any identified problems, such as inadequate sources of supply/repair; analyzes alternative solutions, their associated costs and risks; and outlines estimated funding and actions required to implement the preferred solution(s). Task 403 is applicable only during the Production phase. The post production support analysis is the responsibility of the implementing authority during Production.

### Summary of Task 402 ICOMS:

| | |
|---|---|
| Inputs: | Early Fielding Analysis Report, LSAR. |
| Controls: | DI-P-7119. |
| Outputs: | Post Production Support Plan. |
| Mechanisms: | Contractor. |

### A.9.1   LSA Task 401 – Task Analysis – IDEF$_0$ Node 401

Node 401 on page A-64 presents the tasks necessary to analyze operations and maintenance tasks for the new system/equipment. These include: (1) identifying logistic support resource requirements for each task; (2) identifying new or critical logistic support resource requirements; (3) identifying transportability requirements; (4) identify support requirements which exceed established goals, thresholds or constraints; (5) providing data to support participation in the development of design alternatives to reduce O&S costs, optimize logistic support resource requirements or enhance readiness; and (6) providing source data for preparation of required ILS documents.   Within Task 401 there are eleven major subtasks that are identified and discussed below.
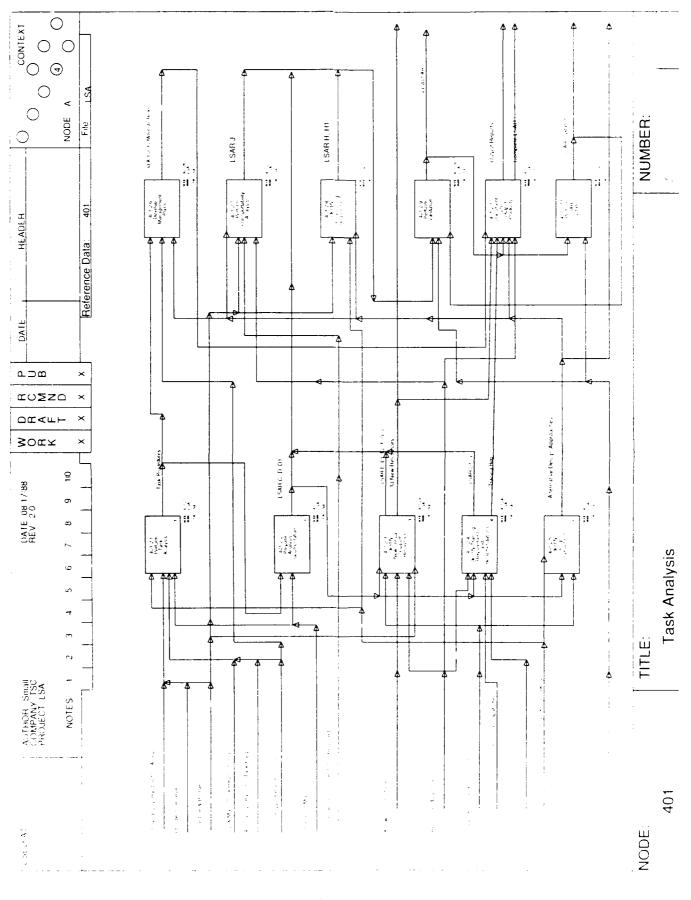
**LSA Subtask 401.2.1 – Perform Task Analysis.** The Contractor conducts a detailed analysis of each operation and maintenance task requirement identified for the new system/equipment (Task 303) and determines the following:

- Procedural steps required to perform the task. These steps include identifying those tasks that are duty position specific, performed principally by one individual, or collective tasks performed by two or more individuals as a team cr crew.

- Logistic support resources required to perform the task.

- Task frequency, task interval, elapsed time, and man hours in the system's intended operational environment, based on the specific annual operating base.

- Maintenance level assignment based on the established support plan (Task 303).

### Summary of Subtask 401.2.1 ICOMS:

Inputs:            Identification of System/Equipment Hardware/Software to Analyze, Identification of Indenture Level, Operations and Mainte-

AUTHOR: Small
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PROJECT LSA

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REV 20

| | | | | |
|---|---|---|---|---|
| W O R K | D R F T | R C A N F | P U M N D B | X |

NOTES  1  2  3  4  5  6  7  8  9  10

HEADER

CONTEXT

NODE  A

File   LSA

DATE

Reference Data   401

IDA TA Management

LSAR J

LSAR H  H1

4.1.1.6
Develop
Management
Plans

4.1.1.2
Perform
Comparability
Analysis

4.1.1.4

4.1.1.8
Perform
Calculation

4.1.1.10

4.1.1.12

Task Procedures

LSAR C  C 0 0

LSAR E

LSAR

4.1.1.1
Perform
Task
Analysis

4.1.1.3
Prepare
Analysis

4.1.1.5

4.1.1.7

4.1.1.9

NODE:   401

TITLE:   Task Analysis

NUMBER:

nance Tasks Required from Task 301, Annual Operating Basis for Task Frequencies, Trade Study from Task 303, Identification of Level of Maintenance, Engineering Drawings (these are not mentioned in MIL-STD-1388-1A but are necessary for this task).

Controls:
Outputs:          Task Analysis.
Mechanisms:       Contractor (Logistics Engineer).

**LSA Subtask 401.2.2 – Perform Analysis Documentation.** The Contractor documents the results of Subtask 401.2.1 in the LSAR or equivalent format approved by the requiring authority.

**Summary of Subtask 401.2.2 ICOMS:**

Inputs:           Task Analysis from Subtask 401.2.1, Identification of Level of Maintenance.
Controls:         MIL-STD-785, MIL-STD-1629, MIL-STD-882.
Outputs:          LSAR Records C, D, D1.
Mechanisms:       Contractor.

**LSA Subtask 401.2.3 – Identify New/Critical Support Requirements.** In this subtask a logistics engineer identifies the logistic support resources required to perform each new or critical task. New resources are defined as those resources requiring development to operate or maintain the new system/equipment. These can include support and test equipment; facilities; new or restructured personnel skills; training devices; new or special transportation systems; new computer resources; and new repair, test, or inspection techniques or procedures to support new design plans or technology. Critical resources are defined as those resources that are not new but require special management attention due to schedule constraints, cost implications, or known scarcities. New and modified logistic support resources are documented in the LSAR to provide a description and justification for the resource requirement.

**Summary of Subtask 401.2.3 ICOMS:**

Inputs:           Task Analysis from Subtask 401.2.1, Known Logistic Support Shortages, Supportability Design Goals from Task 205, Resources Available, Schedule and Budget.
Controls:         MIL-STD-470, MIL-STD-785, MIL-STD-882.
Outputs:          LSAR Records E, E1, E2, F, G, J, Identification of New Resources.
Mechanisms:       Contractor (Logistics Engineer).

**LSA Subtask 401.2.4 – Identify Training Requirements and Recommendations.** In this subtask the Contractor identifies training requirements, makes recommendations for the best mode of training (formal classroom, on-the job, or both), and describes the rationale

for the recommendation based upon the identified task procedures and personnel assignments. The results are documented in the LSAR.

**Summary of Subtask 401.2.4 ICOMS:**

| | |
|---|---|
| Inputs: | Resources Available, Task Analysis from Subtask 401.2.1, Personnel Capabilities, Personnel Limits. |
| Controls: | MIL-STD-470, MIL-STD-785, MIL-STD-1629, MIL-STD-882. |
| Outputs: | LSAR Records D1, G, Training Requirements. |
| Mechanisms: | Contractor. |

**LSA Subtask 401.2.5 – Identify Design Improvements.** In this subtask the Contractor analyzes the total logistic support resource requirements for each task and determines which tasks fail to meet established supportability and supportability related design goals and constraints for the new system/equipment. Tasks are identified that can be optimized or simplified to reduce O&S costs, optimize logistic support resource requirements, or enhance readiness. The Contractor proposes alternative designs and participates in the development of alternative approaches to optimize and simplify tasks or to bring task requirements within acceptable levels.

**Summary of Subtask 401.2.5 ICOMS:**

| | |
|---|---|
| Inputs: | Task Analysis from Subtask 401.2.1, Supportability Design Goals from Task 205, Engineering Drawings. |
| Controls: | MIL-STD-470, MIL-STD-785, MIL-STD-1629, MIL-STD-882. |
| Outputs: | Alternative Design Approaches. |
| Mechanisms: | Contractor (Logistics Engineer). |

**LSA Subtask 401.2.6 – Develop Management Plan.** In this subtask, based on the new or critical logistic support resources, a logistics engineer determines the management actions that can minimize the risks associated with each new critical resource. These actions can include developing detailed tracking procedures, or schedule and budget modifications.

**Summary of Subtask 401.2.6 ICOMS:**

| | |
|---|---|
| Inputs: | Trade Study from Task 303, Task Analysis from Subtask 401.2.1, Alternative Design Approaches from Subtask 401.2.5, Identification of New Resources from Subtask 401.2.3. |
| Controls: | |
| Outputs: | Identification of Actions to Minimize Risks. |
| Mechanisms: | Contractor. |

**LSA Subtask 401.2.7 – Perform Transportability Analysis.** In this subtask the Contractor conducts a transportability analysis on the system/equipment and participates in the development of design alternatives as transportability problem areas are identified.

A-66

**Summary of Subtask 401.2.6 ICOMS:**

| | |
|---|---|
| Inputs: | Task Analysis from Subtask 401.2.1, Supplemental Documentation Required, Resources Available, Trade Study from Task 303, Alternative Design Approaches from Subtask 401.2.5. |
| Controls: | MIL-STD-1367, MIL-STD-470, MIL-STD-785, MIL-STD-882. |
| Outputs: | LSAR Record J. |
| Mechanisms: | Contractor. |

**LSA Subtask 401.2.8 – Identify Provisioning Requirements.** In this subtask, for those support resources requiring initial provisioning, the Contractor documents the provisioning technical documentation in the LSAR.

**Summary of Subtask 401.2.8 ICOMS:**

| | |
|---|---|
| Inputs: | Task Analysis from Subtask 401.2.1, Engineering Drawings, Alternative Design Approaches from Subtask 401.2.5, Schedule and Budget. |
| Controls: | MIL-STD-785, MIL-STD-2073, MIL-STD-1561, MIL-STD-882. |
| Outputs: | LSAR Records H, H1. |
| Mechanisms: | Contractor. |

**LSA Subtask 401.2.9 – Perform Validation.** In this subtask the Contractor validates the key information documented in the LSAR through performance of operations and maintenance tasks on prototype equipment. This validation is conducted using the procedures and resources identified during the performance of Subtask 401.2.1. Updates are made where required. Validation requirements are coordinated with other system engineering demonstrations and tests (for example, maintainability demonstrations, reliability and durability tests) to optimize validation time and requirements.

**Summary of Subtask 401.2.9 ICOMS:**

| | |
|---|---|
| Inputs: | LSAR, Changes to LSAR, LSAR Updates from Subtask 401.2.11. |
| Controls: | MIL-STD-470, MIL-STD-785, MIL-STD-1629, MIL-STD-2073, MIL-STD-1561, MIL-STD-882. |
| Outputs: | LSAR Records (All). |
| Mechanisms: | Contractor. |

**LSA Subtask 401.2.10 – Document ILS Output Products.** In this subtask the Contractor prepares output summaries and reports to satisfy ILS documentation requirements specified by the requiring authority. These requirements include all pertinent data contained in the LSAR at the time of preparation.

**Summary of Subtask 401.2.10 ICOMS:**

| | |
|---|---|
| Inputs: | Valid LSAR, Identification of Action to Minimize Risks, Supplemental Documentation Required, Identification of New Resources |

|            | from Subtask Subtask 401.2.3, Alternative Design Approaches from Subtask 401.2.5, Training Requirements from Subtask 401.2.4. |
| Controls: | MIL-STD-470, MIL-STD-785, MIL-STD-1629, MIL-STD-2073, MIL-STD-1561, MIL-STD-882. |
| Outputs: | (Complete) LSAR Records (All), Summary Reports. |
| Mechanisms: | Contractor. |

**LSA Subtask 401.2.11 – Perform LSAR Updates.** In this subtask the Contractor updates the data in the LSAR as improved information is made available and as applicable input data from other systems engineering programs is updated.

**Summary of Subtask 401.2.11 ICOMS:**

| Inputs: | LSAR, Changes to LSAR. |
| Controls: | MIL-STD-470, MIL-STD-785, MIL-STD-1629, MIL-STD-2073, MIL-STD-1561, MIL-STD-882. |
| Outputs: | LSAR Records (All). |
| Mechanisms: | Contractor |

## A.9.2   LSA Task 402 – Early Fielding Analysis – IDEF$_0$ Node 402

Node 402 on page A-69 presents the tasks necessary to assure effective fielding of the new system with all required resources. Within Task 402 there are five major subtasks which are discussed below.

**LSA Subtask 402.2.1 – Identify New System Impact.** In this subtask the Contractor assesses the impact of the new system/equipment on existing weapon, supply, maintenance, and transportation systems. This assessment examines the impacts on depot workload and scheduling, provisioning and inventory factors, automatic test equipment availability and capability. manpower and personnel factors, training programs and requirements, POL requirements, and transportation systems. It also identifies changes required to support existing weapon systems as a result of new system/equipment requirements.

**Summary of Subtask 402.2.1 ICOMS:**

| Inputs: | LSAR, Trade Study from Task 303, Task Analysis from Task 401. |
| Controls: | |
| Outputs: | New System Impact Report. |
| Mechanisms: | Contractor. |
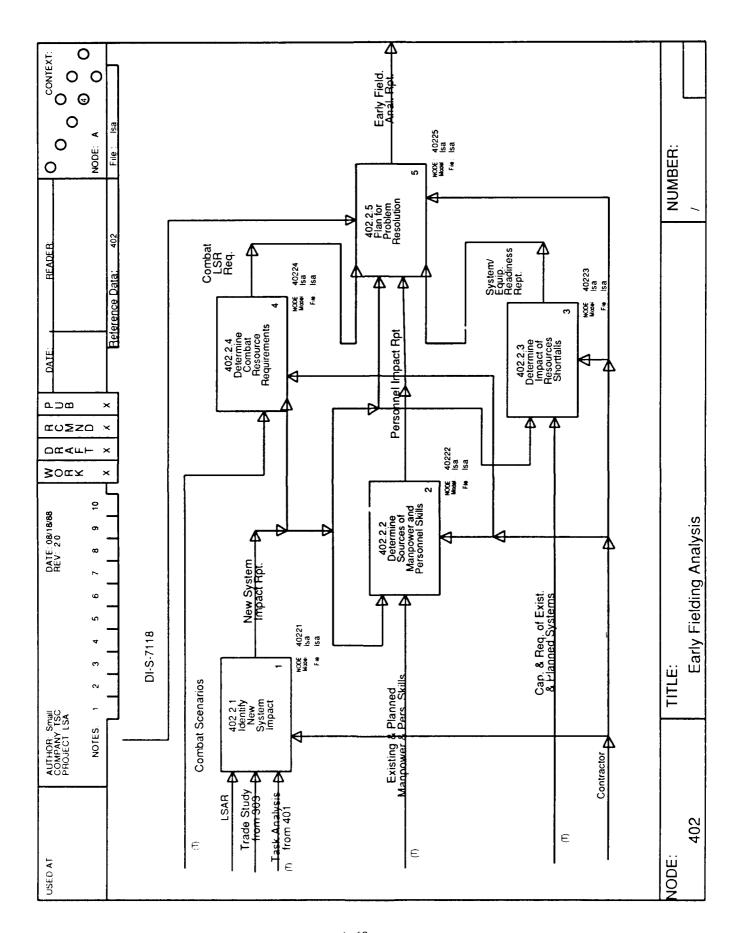
**LSA Subtask 402.2.2 – Determine Sources of Manpower and Personnel Skills.** In this subtask the Contractor is responsible for analyzing existing manpower and personnel sources to determine the required manpower and personnel sources for the new system/

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AUTHOR: Small
COMPANY TSC
PROJECT LSA

DATE: 08/18/88
REV: 2 0

NOTES: 1 2 3 4 5 6 7 8 9 10

READER

DATE

CONTEXT:

NODE: A

File: Isa

WORK | X | | X
DRAFT | | X |
RECMND | | X |
PUB | | X |

DI-S-7118

Reference Data: 402

Combat Scenarios

402.2.1
Identify
New
System
Impact
1

LSAR
Trade Study
from 803
Task Analysis
from 401

New System
Impact Rpt.

NODE
Model
File
40221
Isa
Isa

402.2.2
Determine
Sources of
Manpower and
Personnel Skills
2

NODE
Model
File
40222
Isa
Isa

Existing & Planned
Manpower & Pers. Skills

Cap. & Req. of Exist.
& Planned Systems

Contractor

402.2.4
Determine
Combat
Resource
Requirements
4

Combat
LSR
Req.

NODE
Model
File
40224
Isa
Isa

Personnel Impact Rpt

402.2.3
Determine
Impact of
Resources
Shortfalls
3

NODE
Model
File
40223
Isa
Isa

System/
Equip.
Readiness
Rept.

402.2.5
Plan for
Problem
Resolution
5

NODE
Model
File
40225
Isa
Isa

Early Field.
Anal. Rpt.

NODE: 402

TITLE: Early Fielding Analysis

NUMBER:

equipment. The Contractor also determines the impact of using the identified manpower and personnel sources on existing operational systems.

**Summary of Subtask 402.2.2 ICOMS:**

| | |
|---|---|
| Inputs: | Existing and Planned Manpower and Personnel Skills, New System Impact Report from Subtask 402.2.1. |
| Controls: | |
| Outputs: | Personnel Impact Report. |
| Mechanisms: | Contractor. |

**LSA Subtask 402.2.3 – Determine Impact of Resources Shortfalls.** In this subtask the Contractor is responsible for assessing the impact of failing to obtain the required logistic support resources in the quantities required on system/equipment readiness. The analyses performed under Task 303 are not duplicated.

**Summary of Subtask 402.2.3 ICOMS:**

| | |
|---|---|
| Inputs: | New System Impact Report from Subtask 401.2.1, Capabilities and Requirements of Existing and Planned Systems. |
| Controls: | |
| Outputs: | System and Equipment Readiness Report. |
| Mechanisms: | Contractor. |

**LSA Subtask 402.2.4 – Determine Combat LSR Requirements.** In this subtask the Contractor is responsible for conducting survivability analyses to determine changes in logistic resource requirements based on combat usage. Combat usage encompasses threat assessments, projected combat scenarios, system/equipment vulnerability, battle damage repair capabilities, and component essentials in combat. The purpose of these analyses is to identify and document recommended combat logistic support resources (for example, combat supply support stockage lists) and sources to satisfy the requirements. The analyses performed under Task 303 are not duplicated.

**Summary of Subtask 402.2.4 ICOMS:**

| | |
|---|---|
| Inputs: | Combat Scenarios, New System Impact Report from Subtask 402.2.1. |
| Controls: | |
| Outputs: | Combat LSR Requirements. |
| Mechanisms: | Contractor. |

**LSA Subtask 402.2.5 – Plan for Problem Resolution.** In this subtask the Contractor is responsible for developing plans to resolve problems identified in the assessments and analyses conducted in the preceding tasks for this node.

**Summary of Subtask 402.2.5 ICOMS:**

| | |
|---|---|
| Inputs: | Combat LSR Requirements from Subtask 402.2.4, New System Impact Report from 402.2.1, Personnel Impact Report from Sub- |

task 402.2.2, System/Equipment Readiness Report from Subtask 402.2.3.

Controls:         DI-S-7118.

Outputs:          Early Fielding Analysis Report.

Mechanisms:       Contractor.


### A.9.3   LSA Task 403 – Post Production Support Plan – IDEF$_0$ Node 403

Node 403 on page A-72 presents the tasks necessary to analyze life cycle support requirements of the new system/equipment prior to closing the production lines. This analysis ensures that adequate logistic support resources will be available during the remaining life of the system/equipment. Within Task 403 there is one subtask that is discussed below.

**LSA Subtask 403.2.1 – Perform Post Production Support Analysis.** In this subtask the Contractor is responsible for assessing the useful life of the system/equipment. The Contractor is responsible for identifying system/equipment support items that will present potential problems due to inadequate sources of supply after production line shutdown This task series develops and analyzes alternative solutions for anticipated support difficulties during the remaining life of the system/equipment. A plan is developed that assures effective support during the remaining life of the system along with the estimated funding requirements to implement the plan. This plan address manufacturing, repair centers, data modifications, supply management, and configuration management.

### Summary of Subtask 403.2.1 ICOMS:

Inputs:           Planned Product Improvements, Early Fielding Analysis Report from Task 402, Expected Lifetime of System/Equipment from LSAR, Reliability and Maintainability Data from LSAR (Task 401), Supply and Consumption Data from LSAR (Task 401), Costs for In-house and Contractor Repair, Engineering Data.

Controls:         DI-P-7119.
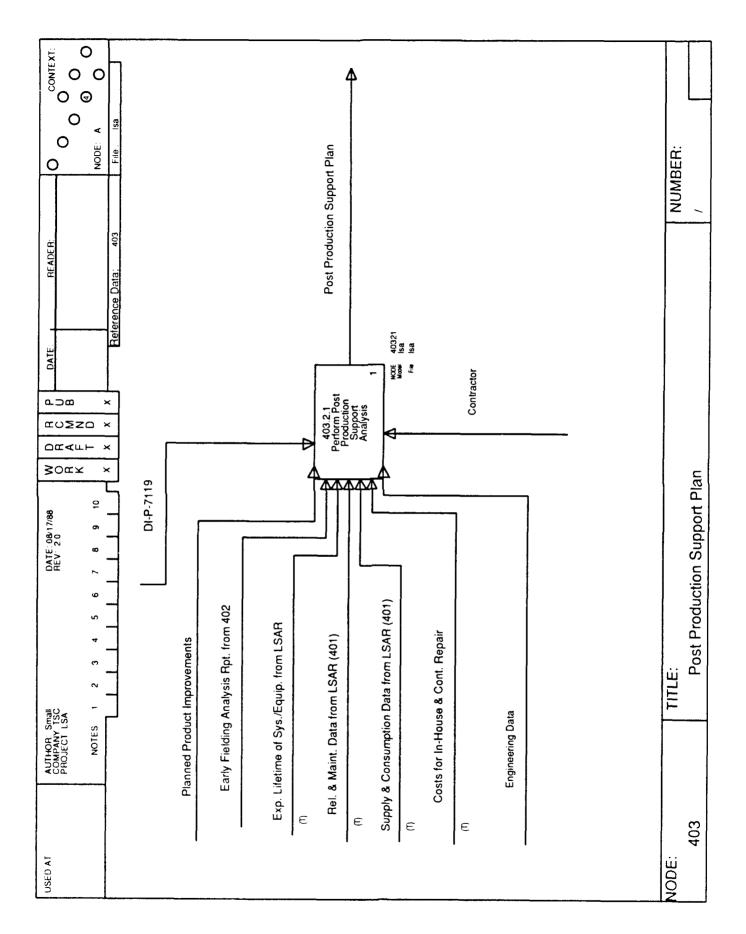
Outputs:          DI-P-7119 (Post Production Support Plan).
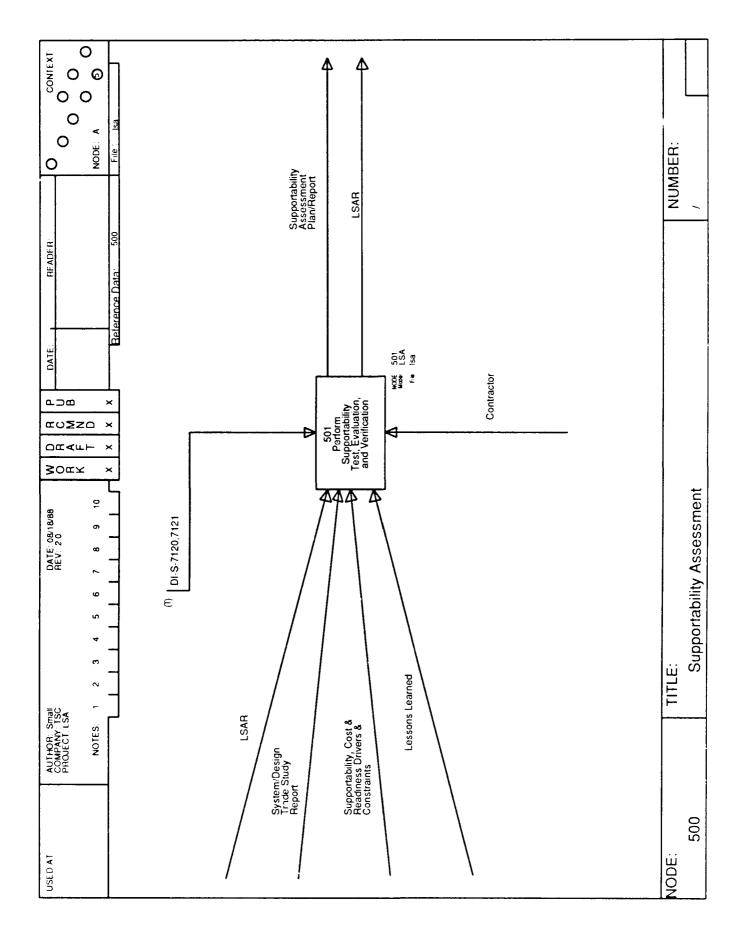
Mechanisms:       Contractor.


### A.10   LSA TASK 500 SERIES – SUPPORTABILITY ASSESSMENT – IDEF$_0$ NODE 500

Node 500 on page A-73 presents an IDEF$_0$ model of the tasks necessary to determine whether the support plan and resources that have been established for acquisition and operation post Program Management Responsibility Transfer (PMRT) are adequate. The Assessment Report indicates the need for improvement. This is an ongoing process for the life of the new system/equipment.

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RECOMMENDED
PUBLICATION
WORKING  x  x  x  x

NOTES  1 2 3 4 5 6 7 8 9 10

DI-P-7119

Planned Product Improvements

Early Fielding Analysis Rpt. from 402

Exp. Lifetime of Sys./Equip. from LSAR

Rel. & Maint. Data from LSAR (401)

Supply & Consumption Data from LSAR (401)

Costs for In-House & Cont. Repair

Engineering Data

403.2.1
Perform Post
Production
Support
Analysis
1

Contractor

Post Production Support Plan

NODE: 40321
Model: Isa
File: Isa

Reference Data: 403

NODE: A  File: Isa

NODE: 403    TITLE: Post Production Support Plan    NUMBER:

A-72

AUTHOR: Small
COMPANY: TSC
PROJECT: LSA

DATE: 08/18/88
REV: 2.0

NOTES: 1 2 3 4 5 6 7 8 9 10

| WORK | DRAFT | RECMND | PUB |
|---|---|---|---|
| x | x | x | x |

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DATE:

CONTEXT:

NODE: A

Reference Data: 500

File: lsa

DI-S-7120,7121

Supportability
Assessment
Plan/Report

LSAR

501
Perform
Supportability
Test, Evaluation,
and Verification

NODE M406
501 LSA
File lsa

Contractor

LSAR

System/Design
Trade Study
Report

Supportability, Cost &
Readiness Drivers &
Constraints

Lessons Learned

NODE: 500

TITLE: Supportability Assessment

NUMBER:

A-73

*LSA Task 501 - Supportability Test, Evaluation, And Verification*

This task is designed to: assess the achievement of specified supportability requirements; identify reasons for deviations from projections; and recommend changes to correct deficiencies and improve system readiness.

Subtask 501.2.1 (T&E Strategy) is usually initiated during CEP. Establishment of T&E program objectives and criteria (Subtask 501.2.2) and updates/corrective actions (Subtask 501.2.3) are usually applicable during D&V and FSD. Subtasks 501.2.4 and 501.2.5, which involve post deployment supportability assessment, are only applicable during FSD and PROD, respectively.

> **Summary of Subtask 501 ICOMS:**
>
> | | |
> |---|---|
> | Inputs: | LSAR, System Design Trade Study Report, Supportability Cost and Readiness Drivers and Constraints, Lessons Learned. |
> | Controls: | DI-S-7120, DI-S-7121. |
> | Outputs: | Supportability Assessment Plan/Report, LSAR. |
> | Mechanisms: | Contractor. |

**A.10.1 LSA Task 501 – Supportability, Test, Evaluation, and Verification – IDEF$_0$ Node 501**
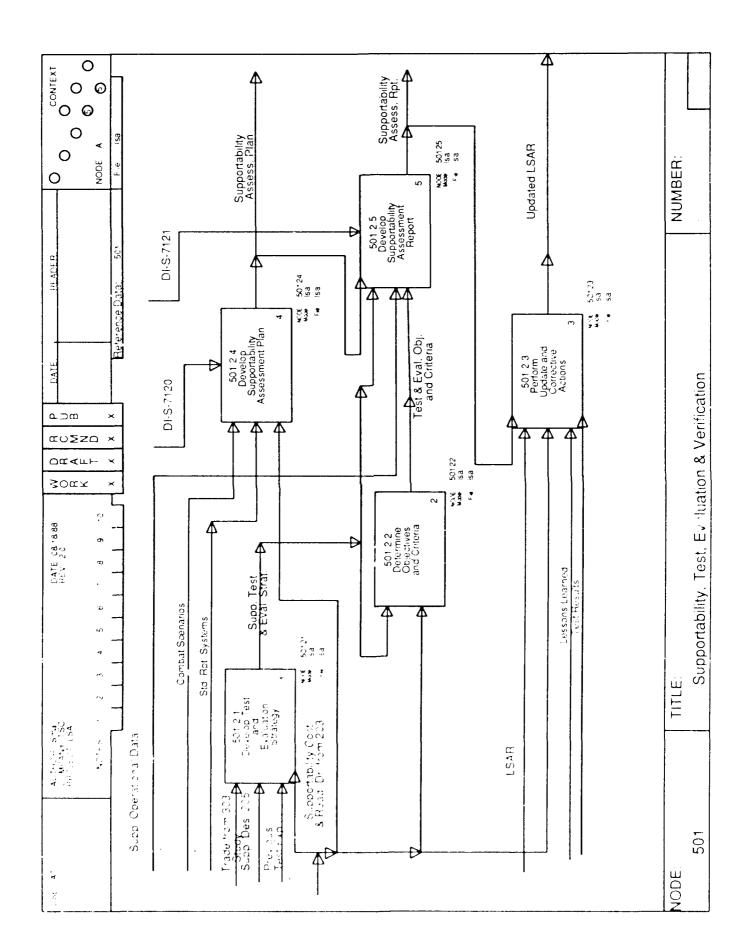
Node 501 on page A-75 presents the tasks necessary to produce a Supportability Assessment Plan. As part of the formal test and evaluation (T&E) program, this task: formulates T&E strategy for input into system T&E plans; establishes T&E program objectives and criteria; identifies test resources, procedures and schedules required to meet the objectives for inclusion in the TEMP; and analyzes T&E results, develops corrective actions, and updates the support plan and LSAR. After deployment, supportability assessment is made by analysing operational maintenance and supply data on the new system in its operational environment. Corrective action is taken as required. Within Task 501 there are five subtasks that are identified and discussed below.

**LSA Subtask 501.2.1 – Develop Test And Evaluation Strategy.** In this subtask the Contractor formulates a test and evaluation strategy to assure that specified supportability and supportability related design requirements are achieved, or achievable, for input into system test and evaluation plans. The test and evaluation strategy formulated is based on quantified supportability requirements for the new system/equipment,; the supportability, cost, and readiness drivers; and supportability issues with a high degree of risk associated with them. Tradeoffs are conducted between the planned test length and cost and the statistical risks incurred. Potential test program limitations in verifying supportability objectives are documented.

> **Summary of Subtask 501.2.1 ICOMS:**
>
> | | |
> |---|---|
> | Inputs: | Trade Study from Task 303, Supportability Design Factors from Task 205, Previous Test Experience, Supp tability Cost and Readiness Drivers from Task 203. |

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DATE

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File: Isa

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R C M N D  ×
D R A F T  ×
W O R K  ×

AUTHOR:
DATE 08-8-88
REV 2.0

Supp Operational Data

Reference Data: 501

1  2  3  4  5  6  7  8  9  10

Combat Scenarios

Std Rct Systems

DI-S-7120

DI-S-7121

Supportability
Assess. Plan

Supportability
Assess. Rpt.

Supp Test
& Eval Strat

Trade from 203
Supp Des 205

Prev ous
Testing

Supportability Con
& Road Dr from 203

501 2 1
Develop Test
and
Evaluation
Strategy
1

501 2 2
Determine
Objectives
and Criteria
2

501 2 4
Develop
Supportability
Assessment Plan
4

501 2 5
Develop
Supportability
Assessment
Report
5

501 2 3
Perform
Update and
Corrective
Actions
3

Test & Eval. Obj.
and Criteria

Updated LSAR

Lessons Learned

Test Results

LSAR

NODE: 501

TITLE: Supportability, Test, Evaluation & Verification

NUMBER:

A-75

Controls:

Outputs:           Supportability Test and Evaluation Strategy.

Mechanisms:     Contractor.

**LSA Subtask 501.2.2 – Determine Objectives and Criteria.** In this subtask the Contractor establishes and documents test and evaluation program objectives and criteria and identifies test resources, procedures, and schedules to be included in the coordinated test program and test and evaluation plans. The objectives and criteria established provide the basis for assuring that critical supportability issues and requirements have been resolved.

    **Summary of Subtask 501.2.2 ICOMS:**

Inputs:            Supportability Test and Evaluation Strategy from Subtask 501.2.1, Supportability Cost and Readiness Drivers from Task 203.

Controls:

Outputs:          Test and Evaluation Objectives and Criteria.

Mechanisms:     Contractor.

**LSA Subtask 501.2.3 – Perform Update and Corrective Actions.** In this subtask the Contractor analyzes the test results and assesses the achievement of specified supportability requirements for the new system/equipment. The extent of improvements required in supportability and supportability related design parameters so that the system/equipment meets established goals and thresholds is determined. Areas where established goals or thresholds have not been demonstrated within acceptable confidence levels are identified. Analyses performed in Task 303 are not duplicated. The Contractor develops corrections for supportability problems uncovered during test and evalu tion. These can include modifications to hardware, software, support plans, logistic support resources, or operational tactics. The documented support plan and logistic support resource requirements contained in the LSAR and LSAR output reports are updated based on the test results. The effects of these updates on the projected costs, readiness, and logistic support resource parameters for the new system/equipment are quantified.

    **Summary of Subtask 501.2.3 ICOMS:**

Inputs:            Supportability Assessment Report from Subtask 501.2.5, LSAR, Lessons Learned, Test Results, Supportability Cost and Readiness Drivers from Task 203.

Controls:

Outputs:          Updated LSAR and Other Systems.

Mechanisms:     Contractor.

**LSA Subtask 501.2.4 – Develop Supportability Assessment Plan.** In this subtask the Contractor analyzes standard reporting systems to determine the amount and accuracy of

supportability information obtained from the new system/equipment in its operational environment. To accomplish this, the Contractor: (1) identifies any shortfalls in measuring accomplishment against the supportability goals established for the new system/equipment, or in verifying supportability factors which were not tested during the acquisition phases of the item's life cycle; (2) develops viable plans for obtaining required supportability data from the field which will not be obtained through standard reporting systems; (3) conducts tradeoff analyses between cost, time required for data collection, number of operational units in which to collect data, and statistical accuracy to identify the best data collection plan; (4) documents specific categories in the data collection plan including cost, duration, method of data collection, operational units, predicted accuracy, and intended use of the data.

**Summary of Subtask 501.2.4 ICOMS:**

| | |
|---|---|
| Inputs: | Standard Reporting Systems (e.g., Reliability And Maintainability Information System (REMIS), Comprehensive Automated Maintenance System (CAMS), DMMIS), Combat Scenarios, Supportability Cost and Readiness Drivers from Task 203. |
| Controls: | DI-S-7120. |
| Outputs: | Supportability Assessment Plan. |
| Mechanisms: | Contractor. |

**LSA Subtask 501.2.5 – Develop Supportability Assessment Report.** In this subtask the Contractor analyzes supportability data as it becomes available from standard supply, maintenance, and readiness reporting systems. Achievement of the goals and thresholds established for the new system/equipment are verified. In those cases where operational results deviate from projections, the causes are determined and corrective actions initiated. Feedback information is analyzed and areas where improvements can be cost effectively accomplished are identified. Recommended improvements are documented.

**Summary of Subtask 501.2.5 ICOMS:**

| | |
|---|---|
| Inputs: | Supportability Assessment Plan from Subtask 501.2.4, Supportability Test and Evaluation Strategy from Subtask 501.2.1, Supportability Operational Data, Test, and Evaluation Objectives and Criteria from Subtask 501.2.2. |
| Controls: | DI-S-7121. |
| Outputs: | Supportability Assessment Report. |
| Mechanisms: | Contractor. |

# APPENDIX B

# DATA FLOW DIAGRAMS OF THE SUPPORT PLANNING PROCESS

# *Table of Contents*

# APPENDIX B
# DATA FLOW DIAGRAMS OF THE SUPPORT PLANNING PROCESS

## B.1 INTRODUCTION

Support planning is a weapon system acquisition process within the Air Force that addresses and documents the support requirements for the weapon system. The process describes how support planning is managed, support requirements analyzed, and requirements validated. Support planning activities are performed primarily by the System Program Office (SPO) and the Contractor. These activities encompass the Integrated Logistic Support (ILS) elements defined in AFR 800-8 and how they interface with Logistic Support Analysis (LSA). The LSA process is governed by MIL-STD-1388-1A, and is described in Volume 1 of this report. In addition, support planning activities include the contractual activities undertaken by the Air Force to acquire the necessary data for support of the weapon system, and delivery of that data to the end users.

The existing LSA process can be analyzed in two ways. The functions the system performs and the mechanisms by which these are done are analyzed using the IDEF$_0$ model (see Appendix A of this volume). The flow of information between activities and external organizations is analyzed using data flow diagrams. This appendix analyzes the support planning process using data flow diagrams.

In analyzing the support planning process, it is evident that there is no typical support planning case, because each weapon system acquisition is different. Although there are as many support planning processes as there are weapon system acquisitions, this is not necessarily undesirable. Analysis of the support planning process in this document is an aggregate of various weapon system acquisitions.

This appendix contains data flow diagrams for the support planning process that help to identify the major organizations involved in the support planning process and their relationships to the SPO and Contractor. A description of the role of each organization is presented in Appendix C of this volume. Appendix B also contains a functional node tree preceding the data flow diagrams. The node tree diagram hierarchically depicts the decomposition of all support planning activities (in contrast to the flow of information between activities and external organizations or entities depicted in a data flow diagram).

In these data flow diagrams, support planning is defined as an acquisition process only, encompassing the LSA process described in MIL-STD-1388-1A, the LSA records (LSAR) described in MIL-STD-1388-2A, and the interface between the LSA process and the ILS functions. The source data for this appendix are the two preceding MIL-STDs, a

number of other Military Standards, Regulations, DIDs, and interviews with Air Force and Contractor personnel. A list of all source data follows Appendix C.

Analysis of the support planning process through the data flow diagrams has provided a baseline for use in future state analysis. In addition the analysis has identified several issues relating to the current environment of LSA. These issues, along with other issues identified elsewhere, are described in Volume 1, Section 3 of this report.

Section 2 of this Appendix defines the Gane and Sarson data flow diagram conventions. Section 3 presents an overview of the support planning process through the functional node tree. The data flow diagrams for each support planning process are contained in Section 4. Section 5 contains definitions for each data flow in a data dictionary. Section 6 lists and defines the support planning source or destination data. Section 7 defines the places where the data is stored during the support planning process. References and points of contact for all appendices in this volume follow Appendix C. A glossary of acronyms follows the Preface to this volume.

## B.2 BACKGROUND

The Gane and Sarson data flow diagramming technique is used to illustrate the Support Planning process and the interfaces between LSA and ILS. The data flow diagrams complement the IDEF$_0$ models of Appendix A by focusing on the sources and destinations of the data flow both within the Air Force and between the Air Force and the Contractor.

### B.2.1 Symbol Conventions

Gane and Sarson data flow diagrams use four symbols to depic the data flow: an external entity, the data flow, the process transforming the data flow, and the data store.

### EXTERNAL ENTITY

An external entity is a logical grouping of organizations or processes that represent a source or destination of data. An external entity is symbolized by two squares with double line thickness superimposed one on the other. The entity can also be identified by a lower case letter in the upper left-hand corner for reference (Figure B-1). Designating an organization or process as an external entity denotes that the entity is outside the boundary of the process being considered.

a
Air
Training
Command

FIGURE B-1. EXTERNAL ENTITY SYMBOL

An external entity symbol depicted with a diagonal line in the lower right corner denotes that this is a duplicate external entity. Duplicate symbols are used to avoid crossing lines in the diagram.

*PROCESS*

A process represents an activity that transforms the flow of data. As depicted in the functional node tree diagram (Figure B-5), each process is hierarchically decomposed from the support planning process. Processes are symbolized by an upright rectangle with rounded corners, divided into three sections: Identification, Description of Function, and Physical Location (Figure B-2). The software on which this report is written is unable to produce rounded corners, therefore a rectangle is depicted with square corners in all the data flow diagrams.
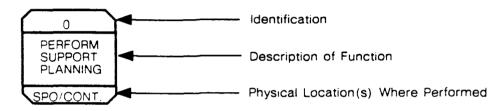
FIGURE B-2. PROCESS SYMBOL

Identification is a number that identifies the process and is sourced from the functional node tree. This number is useful when cross referencing the process to the functional node tree. Description of Function describes the actual support planning process. Physical Location identifies the organizations that are performing the above process.

*DATA FLOW*

A data flow is depicted by an arrow and is often accompanied by a description of its contents (Figure B-3). Definitions of all data flows are listed in the data dictionary of this appendix (Section B.5).
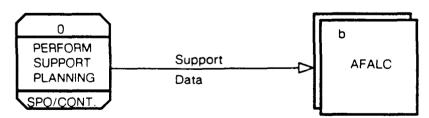
FIGURE B-3. DATA FLOW SYMBOL

As the data flow diagrams are decomposed, the data flows and their definitions are also decomposed into a more detailed level. Note that data flows consist of data only and not physical materials.

*DATA STORE*

During analysis, it is often necessary to define places where data is stored between processes. This is particularly helpful if data does not proceed directly from one process to the next, or if the next process uses the data in a different order. A data store is symbolized by a pair of horizontal lines with two connecting vertical lines, which form a box on the left-hand side, and an open ended rectangle. The box contains the data store reference, represented by the letter "D", followed by a number (Figure B-4). The data store numbering scheme refers to the data store definition (listed in Section B.7) only, and does not represent any hierarchical relationship.

| D01 | LSAR |
|-----|------|

FIGURE B-4. DATA STORE SYMBOL

Explanatory text accompanies each data flow diagram to further explain and define all symbols used in the diagram.

## B.3 FUNCTIONAL NODE TREE

The functional node tree shown in Figure B-5 is a decomposition of the support planning process. The node tree diagram should be used in conjunction with the data flow diagrams to correlate the support planning processes with related organizations and flows of information. Each node on the node tree diagram is expanded into a data flow diagram containing the processes indentured to it on the node tree diagram. Successive levels of decomposition provide more detailed identification of organizations and functions until all the interfaces of LSA with the ILS elements have been identified and analyzed.

## B.4 DATA FLOW DIAGRAMS

This section provides a description of the process, external entities, and primary output for each support planning process, and lists the relevant data flows and data stores. Following the process description is a data flow diagram. Data flows are defined in Section B.5, external entities in Section B.6, and data stores in Section B.7.

### B.4.1 Perform Support Planning – Context Level

Support planning for a weapon system includes the LSA activities which are performed during the weapon system acquisition phase (pre-PMRT), and the ILS interfaces with the LSA process. The process is illustrated in the Context Support Planning data flow diagram on page B-7.

The SPO, representing the Air Force Systems Command (AFSC), is responsible for the overall management of support planning. The Contractor is responsible for performing
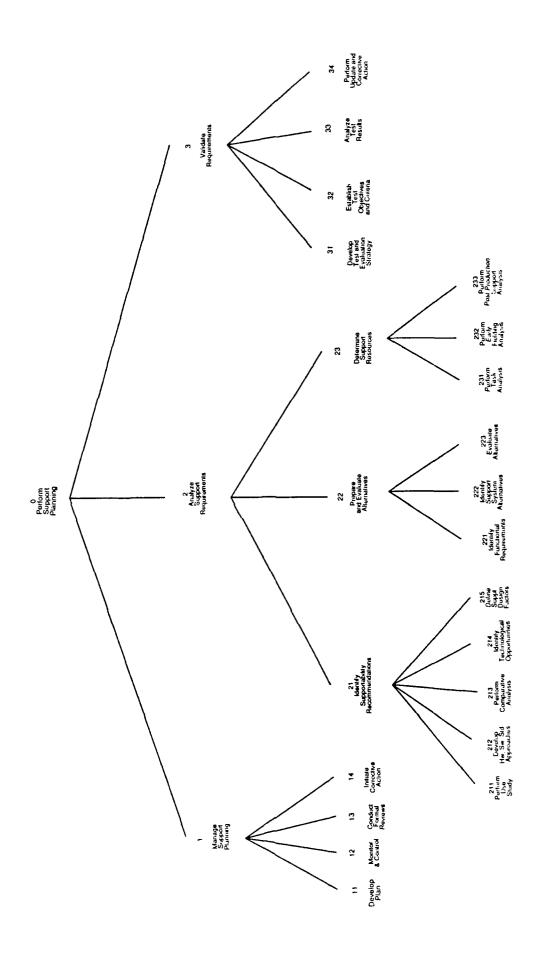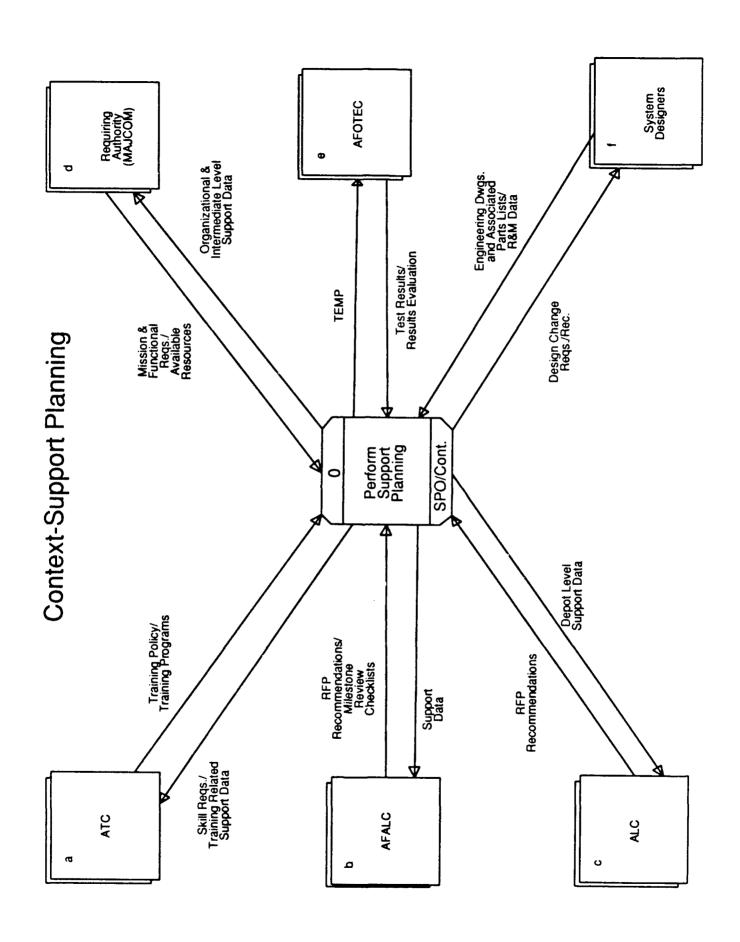
FIGURE B-5. FUNCTIONAL NODE TREE

# Context-Support Planning



Perform Support Planning
0
SPO/Cont.

d — Requiring Authority (MAJCOM)
e — AFOTEC
f — System Designers
a — ATC
b — AFALC
c — ALC

Organizational & Intermediate Level Support Data
Mission & Functional Reqs./ Available Resources
TEMP
Test Results/ Results Evaluation
Engineering Dwgs. and Associated Parts Lists/ R&M Data
Design Change Reqs./Rec.
Training Policy/ Training Programs
Skill Reqs./ Training Related Support Data
RFP Recommendations/ Milestone Review Checklists
Support Data
RFP Recommendations
Depot Level Support Data

most of the analytical tasks within the support planning process. Several Air Force organizations also provide information to and receive information from the support planning process. These organizations and corresponding data flows are identified in the Context level data flow diagram as Air Training Command (ATC), Air Force Acquisition Logistics Center (AFALC), Air Logistics Center (ALC), Requiring Authority (MAJCOM), and Air Force Operational Test and Evaluation Center (AFOTEC). The role of each organization is summarized below.

- *AFALC*. This organization assists the SPO in preparing Requests for Proposal (RFPs) to acquire the proposed weapon system. RFP recommendations include identifying specific Data Item Descriptions (DIDs) and Contract Data Requirements Lists (CDRLs) to put on contract. To reduce the overlap in DIDs and CDRLs on contract, MIL-STD-1388-1A is tailored by the AFALC and the SPO. The objective is to avoid buying the same data more than once and to ensure that all required data is acquired. AFALC also assists the SPO in monitoring the performance of the Contractor by analyzing support data produced by the Contractor (contract deliverables specified by DIDs and CDRLs) against Milestone Review Checklists to ensure that the Contractor is properly addressing support requirements. Contractors are not allowed to continue to the next acquisition phase unless requirements on the checklists have been met.

- *AFOTEC*. This organization performs system testing as required by the SPO and according to the *Test and Evaluation Master Plan* (TEMP), to validate support requirements. The TEMP describes the type and amount of testing to be conducted before each system life cycle milestone and the resources required for such tests. Test results are analyzed by the SPO and the Contractor to ensure that all system requirements are met.

- *ALC*. This organization assists the SPO in preparing RFPs and tailoring MIL-STDs. ALCs receive the results of the depot level support data produced by the Contractor from the SPO, as required by the DIDs and CDRLs.

- *ATC*. This organization sets the training policy to be implemented by the SPO to ensure that trained personnel are available to operate and maintain the new weapon system. The policy varies according to the specifications of each weapon system but always identifies types of training courses currently available, as well as current and projected costs of training. To help determine current deficiencies in skill levels/personnel, Air Training Command receives skill requirements identified via the support planning process. Additional skill requirements identified by the Contractor are used as source material to develop additional training courses.

- *Requiring Authority*. This organization is usually the Using Command (MAJCOM). It develops mission and functional requirements that determine system support requirements for the weapon system in response to perceived security

threats. The Requiring Authority provides the SPO with a listing of currently available resources that may be allocated for use on the new weapon system. Utilization of currently available resources will reduce support costs. The Requiring Authority receives organizational and intermediate level support data (DIDs and CDRLs) produced by the Contractor from the SPO.

- *System Designers.* This Contractor group is the source of engineering drawings, associated parts lists, and reliability and maintainability data. Design change requirements and recommendations from the support planning process are sent to the system designers. During the support planning process, the design is analyzed for supportability. Design analysis outputs are requirements and recommendations for design changes to improve supportability and/or reduce costs. A detailed analysis of Product Definition Data, analyzing engineering drawings and associated data, has been undertaken as a separate module of the CALS effort.

*DATA FLOWS*

Available Resources, Depot Level Support Data, Design Change Recommendations, Design Change Requirements, Engineering Drawings and Associated Parts Lists, Milestone Review Checklists, Mission & Functional Requirements, Organizational & Intermediate Level Support Data, RFP Recommendations, Reliability & Maintainability Data, Results Evaluation, Skill Requirements, Support Data, TEMP, Test Results, Training Policy, Training Programs, Training Related Support Data.
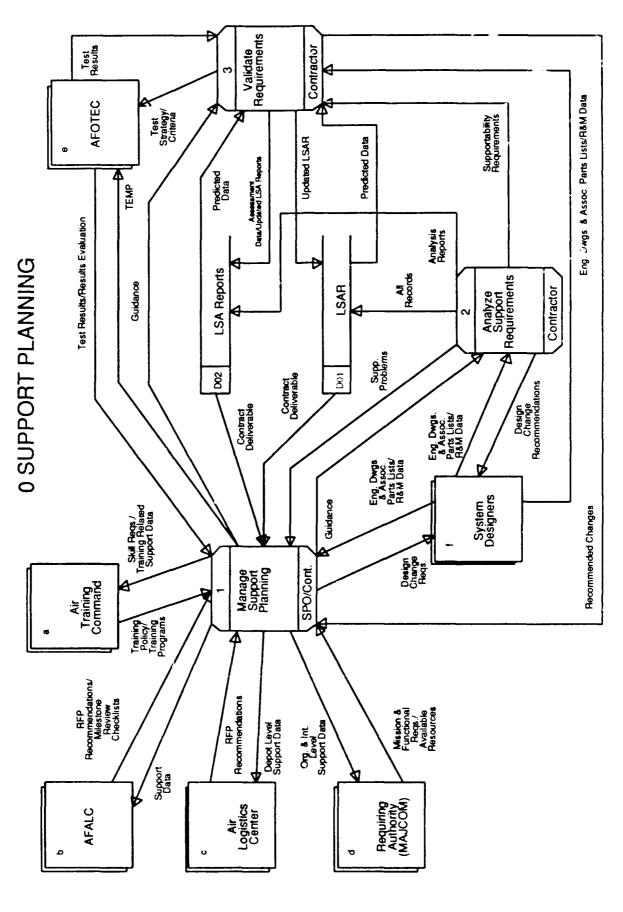
## B.4.2 Node 0 – Perform Support Planning

The support planning process is decomposed into three functions: Manage Support Planning, Analyze Support Requirements, and Validate Requirements. This decomposition is shown in the Node 0 data flow diagram on page B-10 and in the functional node tree diagram (Figure B-5).

## PROCESSES

### Manage Support Planning

Management of the support planning program encompasses all of the surveillance, control, and planning functions associated with the acquisition of a weapon system to ensure that support requirements are fulfilled. These functions include LSA Tasks 101, 102, and 103. Management procedures should assure continuing assessment of analysis results and allow for design and LSA program changes as required. Program management is primarily the responsibility of the SPO through the (ILSM) or Deputy Program Manager for Logistics (DPML). Contractors are encouraged to adopt a parallel ILS organization to manage contractual activities.

# 0 SUPPORT PLANNING

The primary outputs of the management function are guidance to the Contractor (in the form of design change requirements and supportability requirements) and delivery of required support data (usually in the form of DIDs and CDRLs) to Air Training Command, AFALC, AFOTEC, ALCs and the Requiring Authority (MAJCOM) All support data created by the Contractor is routed through the SPO for review and approval before acceptance. This data includes LSAR and LSA Reports as required by contract.

Data contained in the A record (Operations And Maintenance Requirements) are developed to identify operation and maintenance requirements which must be met by the Contractor's weapon system design. The remaining records are developed by the weapon system Contractor and identify (in quantitative terms) the logistics support resources needed to maintain the fielded system. In addition, approximately seventy LSAR output reports can be created from the data contained in the LSAR.

*Analyze Support Requirements*

The weapon system support requirements are analyzed from a supportability standpoint to determine resource requirements of the new weapon system. ILS elements analyzed include: manpower, reliability, transportability, facilities, training, support equipment, provisioning, technical data, computer resources support and maintainability. This analysis is performed by the Contractor with guidance from the SPO, using the system designers and the SPO for the source data. As support requirements are analyzed, design change recommendations are formulated to improve system supportability and/or reduce system life cycle cost. Support problems are reported to the SPO for resolution. Predicted requirements are then validated by the Contractor and updated as necessary. Timing of support requirements analysis is extremely important. The earlier in the system's life cycle that design is analyzed from a support standpoint, the greater the opportunity exists to influence design.

The primary outputs of this analysis are LSAR and LSA Reports as required by contract.

*Validate Requirements*

As required by the SPO and in accordance with the TEMP, AFOTEC conducts formal testing of new weapon systems to assess the achievement of support parameters specified by contract. The Contractor analyzes test results to identify discrepancies between predicted supportability parameters, as detailed in the LSAR and LSA reports, and test or field observed results, reasons for the discrepancies, and the corrective actions required.

The primary outputs of requirements validation are the Supportability Assessment Plan and the Supportability Assessment Report.

*DATA STORES*

   D01 LSAR

D02 LSA Reports

*DATA FLOWS*

All Records, Analysis Reports, Assessment Data, Available Resources, Contract Deliverable, Depot Level Support Data, Design Change Recommendations, Design Change Requirements, Engineering Drawings and Associated Parts Lists, Guidance, Milestone Review Checklists, Mission & Functional Requirements, Predicted Data, Organizational & Intermediate Level Support Data, Recommended Changes, Reliability & Maintainability Data, Results Evaluation, RFP Recommendations, Skill Requirements, Supportability Problems, Supportability Requirements, Support Data, TEMP, Test Results, Test Strategy/ Criteria, Training Policy, Training Programs, Training Related Support Data, Updated LSAR, Updated LSA Reports

### B.4.3 Node 1 – Manage Support Planning

Manage Support Planning is decomposed into four functions: Develop Plan, Monitor and Control, Conduct Formal Reviews, and Initiate Corrective Action. The process is illustrated in the Node 1 data flow diagram on page B-13.

*PROCESSES*

*Node 11: Develop Plan*

Development of the Program Management Plan (PMP) begins during concept exploration and is analyzed in the demonstration and validation decision at Milestone 1. Section 9 of the PMP is the Integrated Logistics Support Plan (ILSP). Once approved the ILSP becomes the directive for all participating organizations. The PMP and the ILSP are both Air Force developed and maintained documents. The ILSP and the LSA process are the basic management tools of the ILS program for integrating support elements and achieving program objectives. Integration of support requirements includes both time phase and ILS element coordination. The latter relies primarily on the LSA process for success.

An integral part of the planning function is to develop contractual requirements for acquiring the weapon system. The SPO, with the assistance of AFALC and the ALCs, develops RFPs which are submitted to Contractors bidding on the contract. CDRLs (identifying the appropriate DIDs) are developed to ensure that all necessary support data is acquired by the Air Force. This analysis is crucial to ensure that the necessary data is purchased at the lowest possible cost.

The Contractor develops and maintains the Integrated Support Plan (ISP) to guide the Contractor's ILS program. It is prepared and updated as required to comply with specific ILS requirements, and approved by the SPO. The Contractor also produces and maintains the LSA Plan (LSAP). This plan identifies and integrates all LSA tasks, identifies management responsibilities and activities, and outlines the approach to accomplishing

# 1 MANAGE SUPPORT PLANNING

analysis tasks to meet program management requirements. The LSAP may be included in the Integrated Support Plan (ISP). Detailed support planning begins during the demonstration and validation phase. Firm support requirements are established during the Full Scale Development Phase.

In addition, the LSAP, which is written in accordance with DID DI-L-7017A, will include an analysis and identification of data interfaces with the following programs:

- System/Equipment Design Program
- System/Equipment Reliability Program
- System/Equipment Maintainability Program
- Human Engineering Program
- Standardization Program
- Parts Control Program
- System Safety Program
- Packaging, Handling, Storage, and Transportability Program
- Initial Provisioning Program
- System/Equipment Testability Program
- Survivability Program
- Training and Training Equipment Program
- Facilities Program
- Support Equipment Program
- Test and Evaluation Program

*Node 12: Monitor and Control*

The SPO and the Contractor perform the monitor and control function of the support planning process. System design and the LSA program is scrutinized on a continuing basis to ensure that supportability objectives are being met. Any problems identified are recorded and corrective action initiated.

*Node 13: Conduct Formal Reviews*

Formal LSA Program reviews are scheduled regularly, to ensure that LSA is an integral part of the design process. In accordance with the contract, supportability and supportability related design requirements are an integral part of each system/equipment design review (SDR), preliminary design review (PDR), and critical design review (CDR), as specified by contract.

LSAR reviews are usually scheduled quarterly. In accordance with the contract, the Contractor is required to submit pertinent data for review (usually 30 days prior to review meeting) to appropriate Air Force personnel. Depending on the acquisition program, the Air Force receives LSAR for review in either paper form (by parcel post) or on-line data systems. Air Force recipients generally include, but are not limited to: the DPML, repre-

sentatives of the Requiring Authority (MAJCOM), and representatives of the appropriate ALC. Maintenance personnel participation at these reviews is imperative for the success and accuracy of the LSA program. LSAR reviews are usually held at the Contractor's site, since availability to design engineers for each piece of equipment is necessary. Engineering drawings and associated parts lists are requested during reviews to properly check the accuracy of the records. If equipment models or prototypes are available at the time of the LSAR review, verification of data accuracy versus available hardware is accomplished at this time. Any problems with the data are recorded in meeting minutes and corrective action initiated.

*Node 14: Initiate Corrective Action*

Data rejected via formal reviews or during general monitoring and controlling of the program must be corrected by the Contractor. Once a problem has been identified, the SPO formulates recommended new actions to be carried out by the Contractor. Once the corrective action has been completed, the SPO assesses the results for approval.

*DATA STORES*

> D01 LSAR
> D02 LSA Reports
> D03 Plans and Updates
> D04 Review Procedures and Schedule
> D05 Accepted LSAR
> D06 Accepted LSA Reports
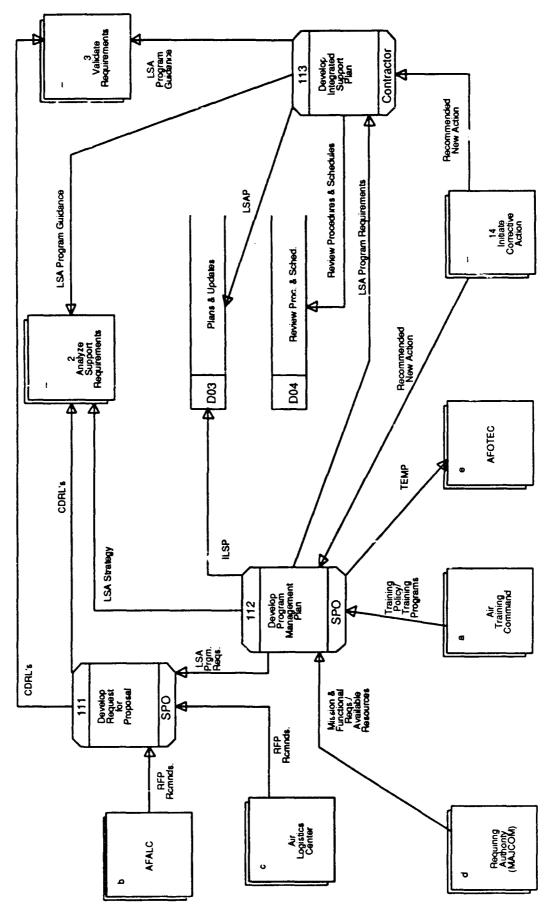
*DATA FLOWS*

Available Resources, Contract Deliverable, Depot Level Support Data. Design Change Requirements, Engineering Drawings and Associated Parts Lists, Guidance, Milestone Review Checklists, Mission & Functional Requirements, Organizational & Intermediate Level Support Data, Plans/Updates, Program Guidelines, Recommended Changes, Recommended New Action, Rejected Data, Review Agenda, Reliability and Maintainability Data, Review Procedures and Schedule, RFP Recommendations, Skill Requirements, Supportability Problems, Support Data. TEMP, Test Results, Training Policy, Training Programs. Training Related Support Data, Unresolved Supportability Problems, Updates, Verified Data.

**B.4.3.1 Node 11 – Develop Plan**

This function is illustrated in the Node 11 data flow diagram on page B-16.

*PROCESSES*

> 111 Develop Request for Proposal

# 11 Develop Plan

112 Develop Program Management Plan

113 Develop Integrated Support Plan

*DATA STORES*

D03 Plans and Updates

D04 Review Procedures and Schedule

*DATA FLOWS*

Available Resources, CDRL's, ILSP, LSAP, LSA Program Guidance, LSA Program Requirements, LSA Strategy, Mission & Functional Requirements, Recommended New Action, Review Procedures and Schedule, RFP Recommendations, TEMP, Training Policy, Training Programs.

### B.4.3.2 Node 12 - Monitor And Control

This function is illustrated in the Node 12 data flow diagram on page B-18.

*PROCESSES*

121 Identify Supportability Deficiencies

122 Analyze Supportability versus Program Guidelines

*DATA STORES*

D03 Plans and Updates

*DATA FLOWS*

Milestone Review Checklists, Program Guidelines, Recognized Deficiencies, Recommended Changes, Resolved Supportability Problems, Supportability Problems, Unresolved Supportability Problems.

### B.4.3.3 Node 13 - Conduct Formal Reviews

This function is illustrated in the Node 13 data flow diagram on page B-19.
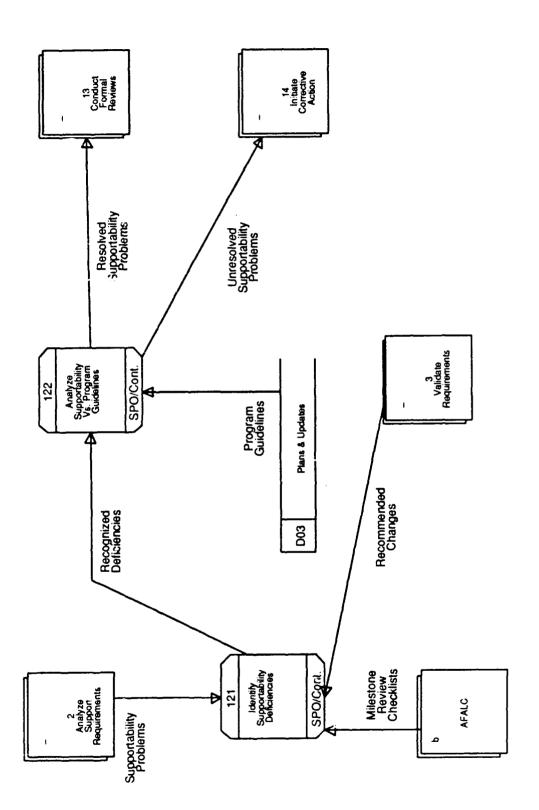
*PROCESSES*
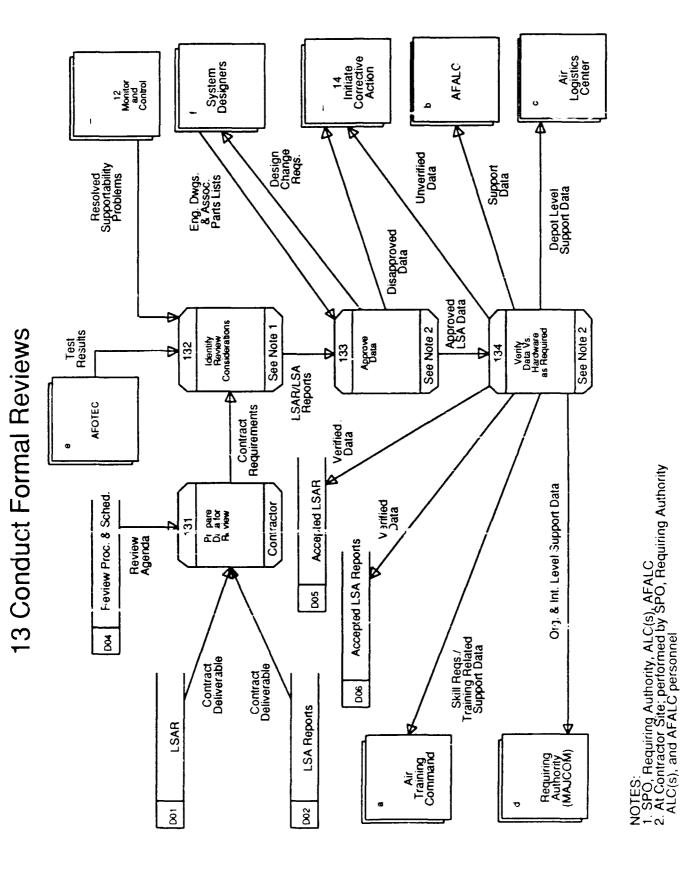
131 Prepare Data for Review

132 Identify Review Considerations

133 Approve Data

134 Verify Data versus Hardware as Required

*DATA STORES*

D01 LSAR

D02 LSA Reports

# 12 Monitor and Control

# 13 Conduct Formal Reviews



NOTES:
1. SPO, Requiring Authority, ALC(s), AFALC
2. At Contractor Site; performed by SPO, Requiring Authority ALC(s), and AFALC personnel

D03 Review Procedures and Schedule
D04 Accepted LSAR
D05 Accepted LSA Reports

*DATA FLOWS*

Approved LSA Data, Contract Deliverable, Contract Requirements, Depot Level Support Data, Design Change Requirements, Disapproved Data, Engineering Drawings and Associated Parts Lists, LSAR LSA Reports, Organizational and Intermediate Level Support Data, Resolved Supportability Problems, Review Agenda, Skill Requirements, Support Data, Test Results, Training Related Support Data, Unverified Data, Verified Data.

### B.4.3.4 Node 14 – Initiate Corrective Action

This function is illustrated in the Node 14 data flow diagram on page B-21

*PROCESSES*

    141 Analyze Supportability and Data Deficiencies
    142 Analyze System Design
    143 Update Support Data as Required
    144 Analyze System Requirements
    145 Develop Alternative Design Approaches
    146 Develop Alternative System Requirements

*DATA FLOWS*

Data Updates, Documentation Inaccuracies, Engineering Drawings and Associated Parts Lists, Rejected Data, Reliability and Maintainability Data, Requirements Implications, Supportability Implications, System Design Deficiencies, System Design Updates, System Requirements Deficiencies, System Requirements Updates, Unresolved Supportability Problems.

### B.4.4 Node 2 – Analyze Support Requirements
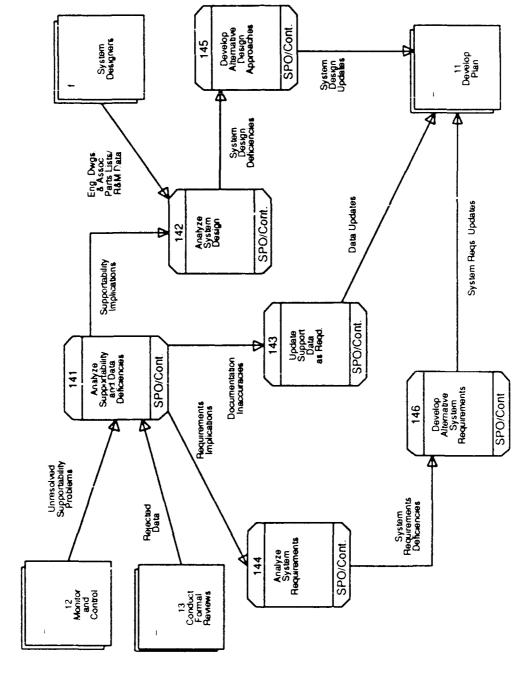
Analyze Support Requirements is decomposed into three functions: Identify Supportability Recommendations, Prepare and Evaluate Alternatives, and Determine Support Resources. Process components are illustrated in the Node 2 data flow diagram on page B-22.

*PROCESSES*

*Node 21: Identify Supportability Recommendations*

Supportability recommendations are developed early in the weapon system life cycle to influence design and for use in trade off studies. Comparisons with existing systems are analyzed to identify supportability constraints and opportunities for improvement. The intended use of the weapon system is defined in quantitative terms. Standardization

# 14 Initiate Corrective Action

Manage Support Planning
1

Identify Supportability Rqmnts.
21
Contractor

Prepare and Evaluate Alternatives
22
Contractor

Determine Support Resources
23
Contractor

Validate Requirements
3

System Designers

D01 LSAR

D02 LSA Reports

Available Resources

Support Resources Problems

Support System Problems

Guidance

Supportability Related Design Factors

C thru J Records

Support Resources Reports

B thru J Records

Functional Reqs / Rec Support Plan/ Tradeoff Results

Eng. Dwgs. & Assoc. Parts Lists/R&M Data

Trade Study Reports

A Records

Support Systems Reports

Support Drivers

Tradeoff Analysis

Trade Study Analysis

Eng. Dwgs. & Assoc. Parts Lists/R&M Data

Design Change Rec.

Supp. Systems Analysis

Eng. Dwgs. & Assoc. Parts Lists/ R&M Data

Design Change Rec.

Design Change Rec.

approaches and technological opportunities are identified, and supportability requirements developed.

*Node 22: Prepare and Evaluate Alternatives*

These tasks identify the functional requirements of the weapon system designed by the Contractor. Functional requirements of alternative support systems are also analyzed and evaluated to optimize supportability at the lowest possible cost. These tasks are the responsibility of the Contractor, subject to SPO approval.

*Node 23: Determine Support Resources*

Using task analysis the logistic support resource requirements for the weapon system's operational and support environment are identified and documented in the LSAR by the Contractor's Logistics Engineering staff. During the analysis principal elements of ILS are identified in quantifiable terms. Results of early fielding analyses are studied to determine impacts on existing systems and/or equipment. In addition, post production support planning is conducted to ensure adequate life cycle support.

*DATA STORES*

> D01 LSAR
> D02 LSA Reports

*DATA FLOWS*

A Records, Available Resources, B through J Records, C through J Records, Design Change Recommendations, Engineering Drawings and Associated Parts Lists, Functional Requirements, Guidance, Reliability and Maintainability Data, Recommended Support Plan, Support Resources Problems, Support Resources Reports, Support Drivers, Support System Problems, Support Systems Analysis, Support Systems Reports, Supportability Related Design Factors, Tradeoff Analysis, Tradeoff Results, Trade Study Analysis, Trade Study Reports.

**B.4.4.1 Node 21 – Identify Supportability Recommendations**
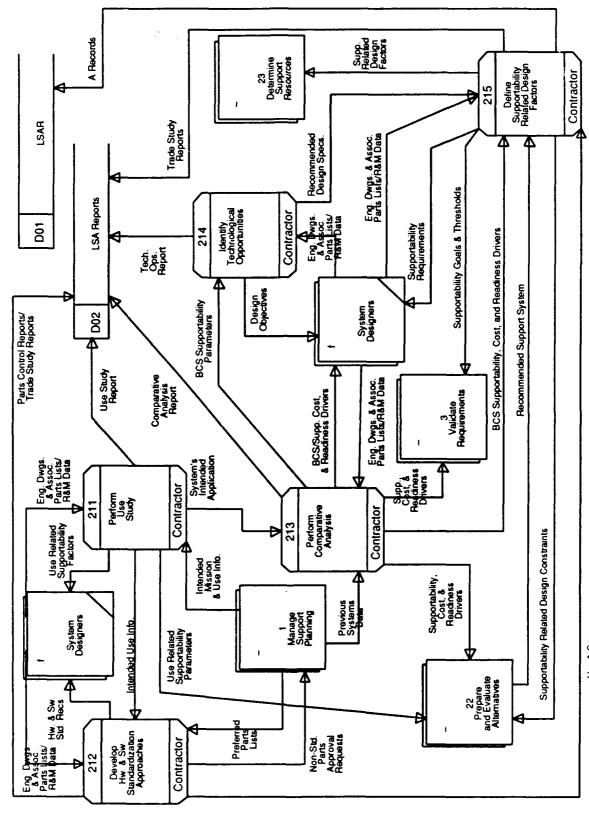
Identify Supportability Recommendations is decomposed into five functions: Perform Use Study, Develop Hardware and Software Standardization Approach, Perform Comparative Analysis, Identify Technological Opportunities, and Define Supportability Related Design Factors. The process is illustrated in the Node 21 data flow diagram on page B-24.

*PROCESSES*

*Node 211: Perform Use Study*

The use study report is developed by the Requiring Authority to identify support factors relating to the intended use of the proposed system. These support factors include:

# 21 Identify Supportability Recommendations

number of systems to be supported, allowable maintenance periods, operating requirements (i.e. use rates), and environmental requirements (i.e. climate tolerances). These factors must be documented in quantifiable terms because they will be used to develop a Baseline Comparison System and System/Design Trade Study Reports.

*Node 212: Develop Hardware and Software Standardization Approaches*

In this task the Contractor defines in quantitative terms all relevant support resources (existing and planned) which can be allocated to the new system. All ILS elements are considered: manpower and personnel; maintenance planning; supply support; support and test equipment; training (skill levels); technical data; computer resources; facilities; and packaging, handling, storage, and transportability resources. The Contractor recommends hardware and software standardization approaches based on cost, readiness, or supportability considerations. The Contractor also defines supportability related design constraints and identifies the risks associated with each constraint.

*Node 213: Perform Comparative Analysis*

In this task the Contractor develops a Baseline Comparison System for projecting supportability parameters, identifying areas for improvement, and determining the supportability, cost, and readiness drivers of the new system. Comparisons made with existing systems are analyzed to identify risks and qualitative supportability problems with the new system/equipment.

*Node 214: Identify Technological Opportunities*

In this task the Contractor identifies technological advancements that offer opportunities to improve the supportability characteristics and requirements of the new system. This analysis establishes the recommended design objectives and identifies the risks associated with each design objective. As the system design progresses, design objectives are updated.

*Node 215: Define Supportability Related Design Factors*

In this task the Contractor quantifies supportability related design factors for each alternative design and operational concept. As new system alternatives are defined, objectives for supportability, cost, and readiness are updated; and the goals and thresholds established.

*DATA STORES*

    D01  LSAR
    D02  LSA Reports

*DATA FLOWS*

A Records, BCS Supportability, Cost and Readiness Drivers, BCS Supportability Parameters, Comparative Analysis Report, Design Objectives, Engineering Drawings and Associ-

ated Parts Lists, Hardware and Software Standardization Recommendations, Hardware and Software Standardization Related Supportability Characteristics, Intended Mission and Use Information, Intended Use Information, Non-Standard Parts Approval Requests, Parts Control Reports, Preferred Parts Lists, Previous Systems Data, Recommended Design Specifications, Recommended Support System, Reliability and Maintainability Data, Supportability, Cost, and Readiness Drivers, Supportability Goals and Thresholds, Supportability Related Design Constraints, Supportability Related Design Factors, Supportability Requirements, System's Intended Application, Technological Opportunities Report, Trade Study Reports, Use Related Supportability Factors, Use Related Supportability Parameters, Use Study Report.

### B.4.4.1.1 Node 211 - Perform Use Study

This function is illustrated in the Node 211 data flow diagram on page B-27.

*PROCESSES*

    2111 Identify Supportability Factors
    2112 Identify Quantitative Factors
    2113 Conduct Field Visits
    2114 Prepare Use Study Report

*DATA STORES*

    D07 Use Study Report

*DATA FLOWS*

Engineering Drawings and Associated Parts Lists, Field Visit Locations, Field Visit Reports, Intended Mission and Use Information, Intended Use Information, Qualitative Supportability Factors, Quantified Supportability Factors, Reliability and Maintainability Data, System's Intended Application, Use Related Supportability Factors, Use Study Report.

### B.4.4.1.2 Node 212 - Develop Hardware and Software Standardization Approaches

This function is illustrated in the Node 212 data flow diagram on page B-28.

*PROCESSES*

    2121 Identify Supportability Constraints
    2122 Identify Supportability Characteristics
    2123 Develop Recommended Approaches
    2124 Identify Standardization Related Risks
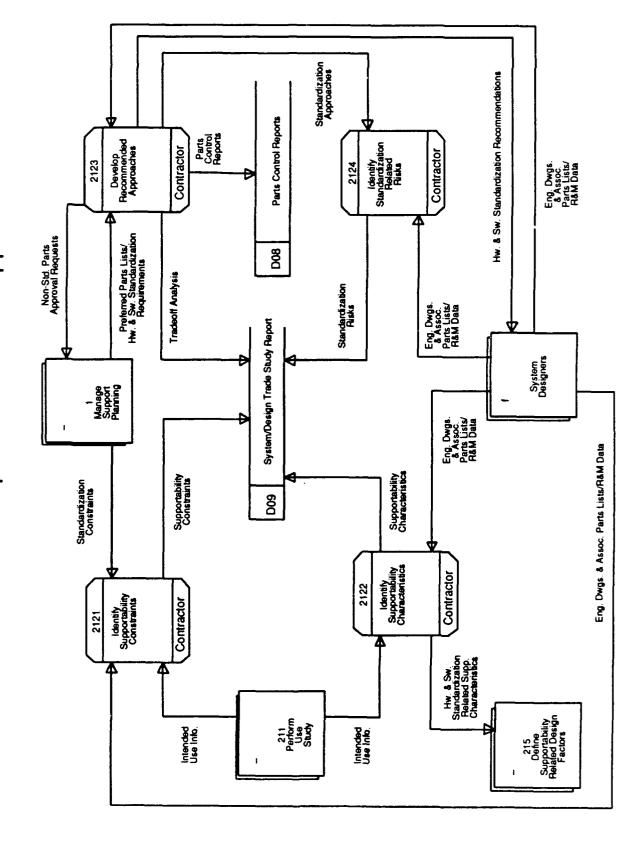
*DATA STORES*

    D08 Parts Control Reports
    D09 System/Design Trade Study Reports

# 211 Perform Use Study

# 212 Develop Hw. & Sw. Std. Approaches

*DATA FLOWS*

Engineering Drawings and Associated Parts Lists, Field Visit Reports, Hardware and Software Standardization Recommendations, Hardware and Software Standardization Related Supportability Characteristics, Hardware and Software Standardization Requirements, Intended Use Information, Non-Standard Parts Approval Requests, Parts Control Reports, Preferred Parts Lists, Reliability and Maintainability Data, Standardization Approaches, Standardization Constraints, Standardization Risks, Supportability Characteristics, Supportability Constraints, Tradeoff Analysis.

### B.4.4.1.3 Node 213 - Perform Comparative Analysis

This function is illustrated in the Node 213 data flow diagram on page B-30.

*PROCESSES*

> 2131 Identify Comparative Systems
> 2132 Develop Baseline Comparison System
> 2133 Identify Comparative System Characteristics
> 2134 Identify Qualitative Supportability Problems
> 2135 Determine Supportability, Cost, and Readiness Drivers
> 2136 Identify Unique System Drivers
> 2137 Identify BCS Risks and Assumptions

*DATA STORES*

> D10 Comparative Analysis Report

*DATA FLOWS*
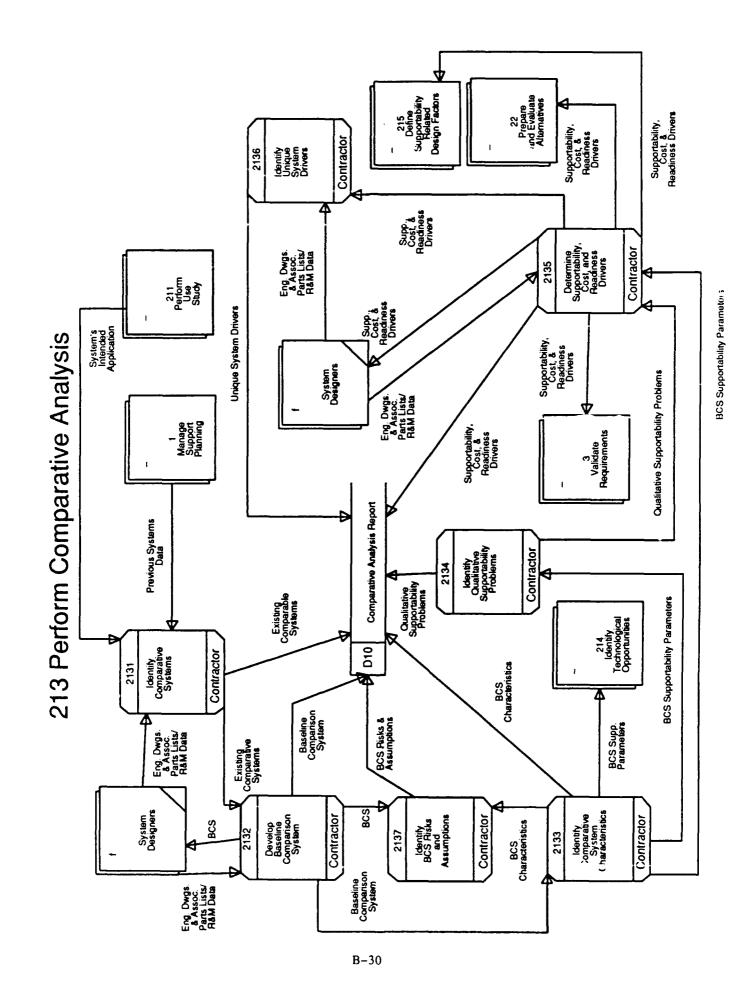
Baseline Comparison System, BCS Characteristics, BCS Risks and Assumptions, BCS Supportability Parameters, Engineering Drawings and Associated Parts Lists, Existing Comparable Systems, Previous Systems Data, Qualitative Supportability Problems, Reliability and Maintainability Data, Supportability, Cost and Readiness Drivers, System's Intended Application, Unique System Drivers.

### B.4.4.1.4 Node 214 - Identify Technological Opportunities
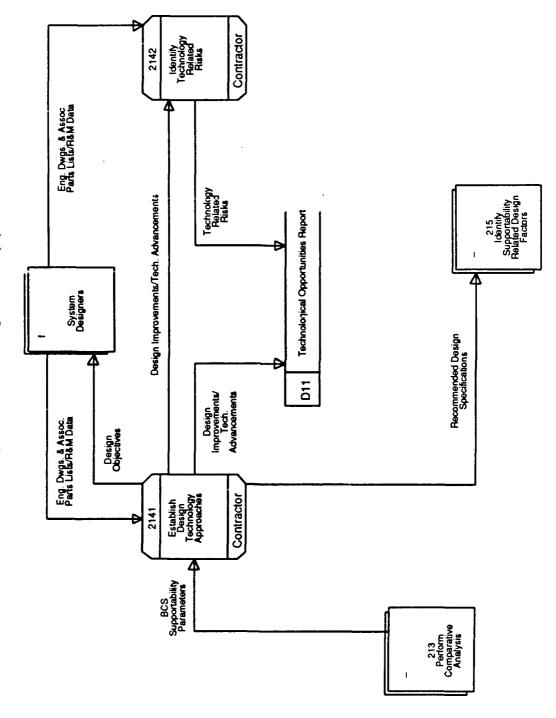
This function is illustrated in the Node 214 data flow diagram on page B-31.

*PROCESSES*

> 2141 Establish Design Technology Approaches
> 2142 Identify Technology Related Risks

# 213 Perform Comparative Analysis

# 214 Identify Technological Opportunities

*DATA STORES*

D11 Technological Opportunities Report

*DATA FLOWS*

BCS Supportability Parameters, Design Objectives, Design Improvements, Engineering Drawings and Associated Parts Lists, Recommended Design Specifications, Reliability and Maintainability Data, Technology Advancements, Technology Related Risks.

**B.4.4.1.5 Node 215 – Identify Supportability Related Design Factors**

This function is illustrated in the Node 215 data flow diagram on page B-33.

*PROCESSES*

2151 Identify Supportability Characteristics
2152 Establish Supportability Objectives and Identify Associated Risks
2153 Establish Supportability Related Design Constraints
2154 Identify NATO Constraints
2155 Establish Supportability Goals and Thresholds

*DATA STORES*

D09 System/Design Trade Study Report
D15 A Records

*DATA FLOWS*
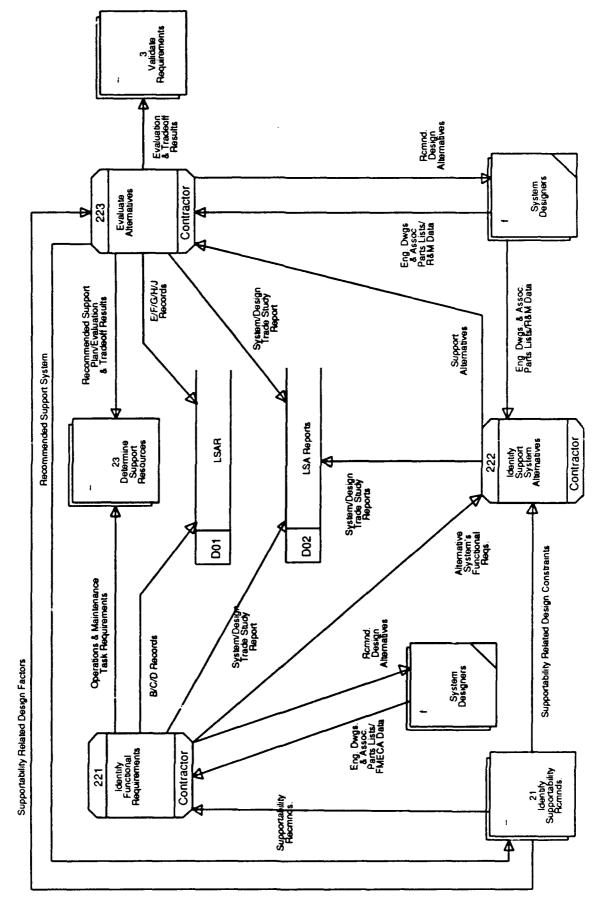
Engineering Drawings and Associated Parts Lists, Hardware and Software Standardization Related Supportability Constraints, NATO Constraints, Recommended Design Specifications, Recommended Support System, Reliability and Maintainability Data, Supportability Characteristics, Supportability, Cost and Readiness Drivers, Supportability Goals and Thresholds, Supportability Objectives and Risks, Supportability Related Design Constraints.

**B.4.4.2 Node 22 – Prepare And Evaluate Alternatives**

Prepare and Evaluate Alternatives is decomposed into three functions: Identify Functional Requirements, Identify Support System Alternatives, and Evaluate Alternatives. The process is illustrated in the Node 22 data flow diagram on page B-34.

# 215 Identify Supportability Related Design Factors

# 22 Prepare and Evaluate Alternatives

## PROCESSES

*Node 221: Identify Functional Requirements*

The operations and support (O&S) functions for each system alternative are identified and analyzed. Risks and unique functional requirements for each system under consideration are identified. The results of failure modes, effects, and criticality analysis are analyzed to determine corrective maintenance task requirements. Reliability Centered Maintenance (RCM) analysis is used to identify necessary preventative maintenance actions. Design alternatives are identified to correct design deficiencies uncovered via functional requirements analysis.

*Node 222: Identify Support System Alternatives*

The Contractor is responsible for identifying support system alternatives to be evaluated for the new system. This includes performance of a tradeoff analysis, and determination of the best system to be developed. Alternatives must satisfy the functional requirements of the new system as identified above. Support plans for evaluation of each support system alternative are documented in System/Design Trade Study Reports.

*Node 223: Evaluate Alternatives*

Alternative support systems identified above are evaluated against several system supportability criteria to optimize cost, schedule, performance, readiness, and supportability.

## DATA STORES

> D01 LSAR
> D02 LSA Reports
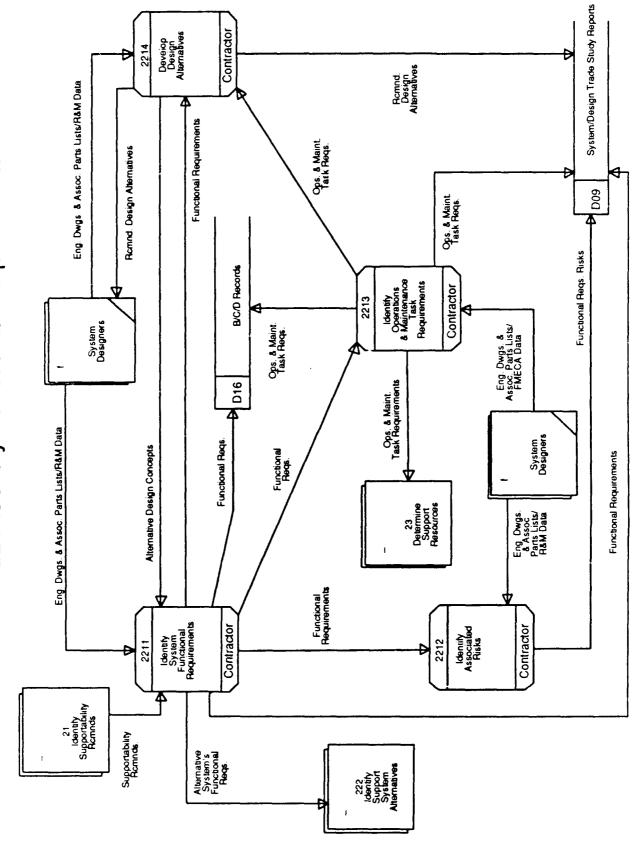
## DATA FLOWS

Alternative System's Functional Requirements, B/C/D Records, E/F/G/H/J Records, Engineering Drawings and Associated Parts Lists, Evaluation and Tradeoff Results, FMECA Data, Operations and Maintenance Task Requirements, Recommended Design Alternatives, Recommended Support Plan, Recommended Support System, Reliability and Maintainability Data, Support Alternatives, Supportability Recommendations, Supportability Related Design Constraints, Supportability Related Design Factors, System/Design Trade Study Report

## B.4.4.2.1 Node 221 – Identify Functional Requirements

This function is illustrated in the Node 221 data flow diagram on page B-36.

# 221 Identify Functional Requirements

PROCESSES

2211 Identify System Functional Requirements
2212 Identify Associated Risks
2213 Identify Operations and Maintenance Task Requirements
2214 Develop Design Alternatives

DATA STORES

D09 System/Design Trade Study Reports
D16 B/C/D Records

DATA FLOWS

Alternative Design Concepts. Alternative System's Functional Requirements, Engineering Drawings and Associated Parts Lists, FMECA Data. Functional Requirements, Functional Requirements Risks. Operations and Maintenance Task Requirements, Recommended Design Alternatives. Reliability and Maintainability Data. Supportability Recommendations.

### B.4.4.2.2 Node 222 – Identify Support System Alternatives

This function is illustrated in the Node 222 data flow diagram on page B-38.

PROCESSES

2221 Develop Alternative Support Concepts
2222 Develop Alternative Support Plans
2223 Identify Risks Associated with Each Support Alternative

DATA STORES

D09 System/Design Trade Study Report

DATA FLOWS

Alternative Support Concepts, Alternative Support Plans, Alternative System's Functional Requirements, Engineering Drawings and Associated Parts Lists, Reliability and Maintainability Data. Support Alternative Risks, Support System Risks, Supportability Related Design Constraints.
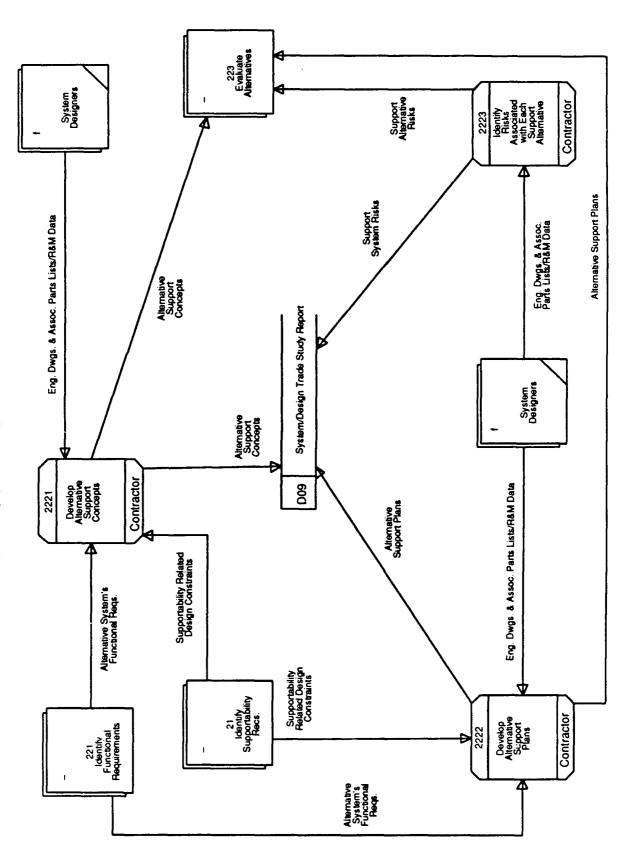
### B.4.4.2.3 Node 223 – Evaluate Alternatives

This function is illustrated in the Node 223 data flow diagram on page B-39.
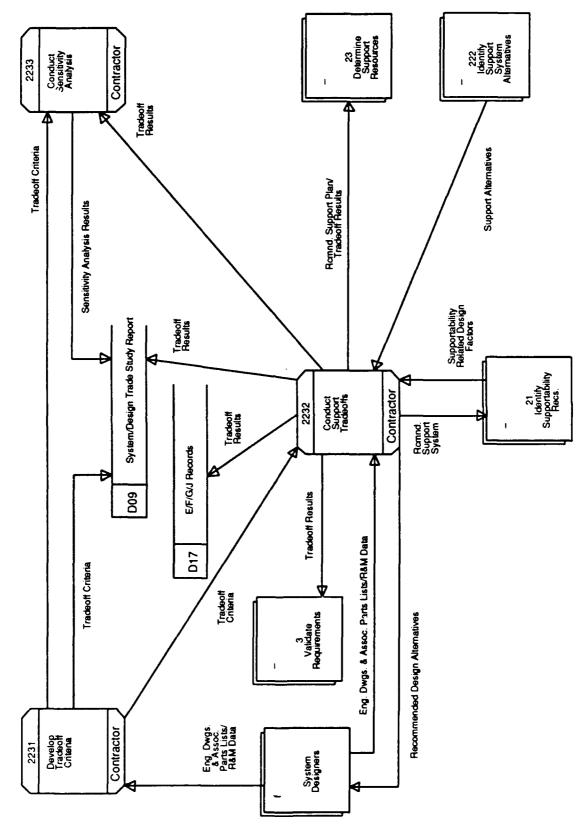
PROCESSES

2231 Develop Tradeoff Criteria
2232 Conduct Support Tradeoffs
2233 Conduct Sensitivity Analysis

# 222 Identify Support System Alternatives

# 223 Evaluate Alternatives

*DATA STORES*

> D09 System/Design Trade Study Report
> D17 E/F/G/J Records

*DATA FLOWS*

Engineering Drawings and Associated Parts Lists, Recommended Design Alternatives, Recommended Support Plan, Recommended Support System, Reliability and Maintainability Data, Sensitivity Analysis Results, Support Alternatives, Supportability Related Design Factors, Tradeoff Criteria, Tradeoff Results

### B.4.4.3 Node 23 – Determine Support Resources

Determine Support Resources is decomposed into three functions: Perform Task Analysis, Perform Early Fielding Analysis, and Perform Post Production Support Analysis. The process is illustrated in the Node 23 data flow diagram on page B-41.

*PROCESSES*

*Node 231: Perform Task Analysis*

The Contractor conducts a detailed analysis of the system's planned function and design to determine procedural steps for each operational and maintenance task. All ILS elements are analyzed to identify the logistics support resources required to perform each task. Task procedures, including the identification of all required resources (ILS elements), are documented in the LSAR.
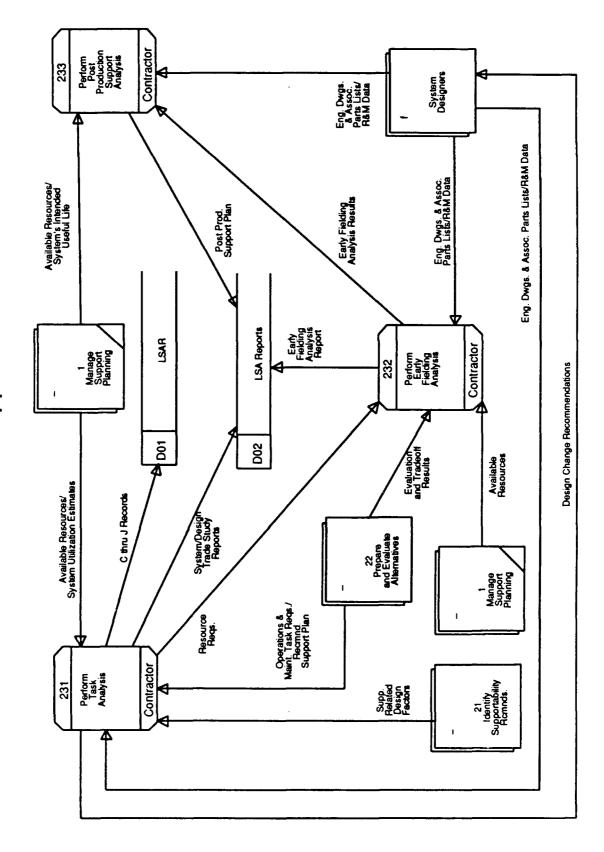
*Node 232: Perform Early Fielding Analysis*

The fielding of a new weapon system impacts the support of existing weapon systems. In this task the Contractor assesses: depot workload and scheduling changes, provisioning factors, support equipment availability, manpower and personnel factors, training requirement increases, and transportation requirements. This analysis also defines any changes required to support existing systems due to the new system requirements.

*Node 233: Perform Post Production Support Analysis*

The Contractor analyses post production support to ensure that the life cycle support requirements of the new system will be met prior to the production line closing. Items of the system that could present availability problems once the production line is closed down are identified. The Post Production Support Plan ensures effective support throughout the system's life cycle and provides the estimated funding requirements to implement the plan.

# 23 Determine Support Resources

*DATA STORES*

    D01 LSAR
    D02 LSA Reports

*DATA FLOWS*

Available Resources, C through J Records, Design Change Recommendations, Early Fielding Analysis Report, Early Fielding Analysis Results, Engineering Drawings and Associated Parts Lists, Evaluation and Tradeoff Results, Operations and Maintenance Task Requirements, Post-Production Support Plan, Recommended Support Plan, Reliability and Maintainability Data, Resource Requirements, Supportability Related Design Factors, System Utilization Estimates, System's Intended Useful Life, System/Design Trade Study Reports.

### B.4.4.3.1  Node 23* – Perform Task Analysis

This function is illustrated in the Node 231 data flow diagram on page B-43.

*PROCESSES*

    2311 Develop Operations and Maintenance Procedures
    2312 Identify Logistic Resource Requirements

*DATA STORES*

    D18 C/D Records
    D19 H Records
    D20 G Records
    D21 E Records
    D22 F Records
    D23 J Records

*DATA FLOWS*
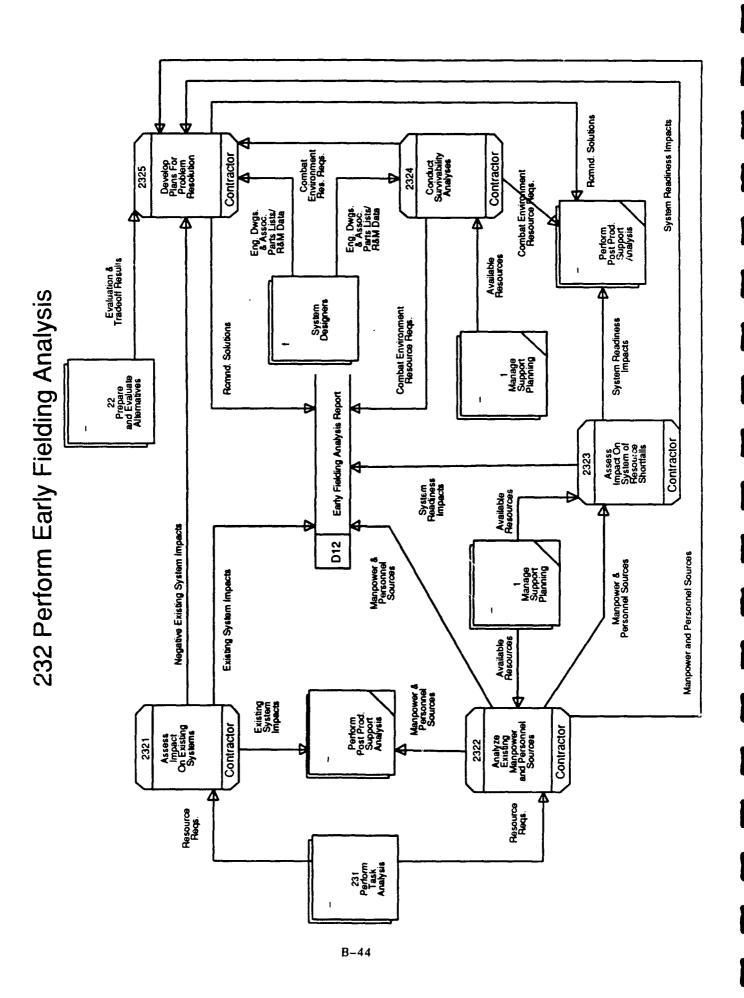
Available Resources, Design Change Recommendations, Engineering Drawings and Associated Parts Lists, Facilities Requirements, Manpower Requirements, Operations and Maintenance Task Requirements, Procedural Task Descriptions, Provisioning Requirements, Recommended Support Plan, Reliability and Maintainability Data, Resources Required per Task, Resource Requirements, Skill Requirements, Support Equipment Requirements, Support Resources Problems, Supportability Related Design Factors, System Utilization Estimates, Transportability Requirements.

### B.4.4.3.2  Node 232 – Perform Early Fielding Analysis

This function is illustrated in the Node 232 data flow diagram on page B-44.

# 231 Perform Task Analysis

# 232 Perform Early Fielding Analysis

*PROCESSES*

    2321 Assess Impact On Existing Systems

    2322 Analyze Existing Manpower and Personnel Sources

    2323 Assess Impact On System of Resource Shortfalls

    2324 Conduct Survivability Analysis

    2325 Develop Plans For Problem Resolution

*DATA STORES*

    D12 Early Fielding Analysis Report

*DATA FLOWS*

Available Resources, Combat Environment Resource Requirements, Engineering Drawings and Associated Parts Lists, Evaluation and Tradeoff Results, Existing System Impacts, Manpower and Personnel Sources, Negative Existing System Impacts, Recommended Solutions, Reliability and Maintainability Data, Resource Requirements, System Readiness Impacts.

**B.4.4.3.3 Node 233 – Perform Post Production Support Analysis**

This function is illustrated in the Node 233 data flow diagram on page B-46.

*PROCESSES*

    2331 Identify Production Line Dependent Items

    2332 Develop Alternative Solutions For Production Line Dependent Items

*DATA STORES*

    D13 Post Production Support Plan
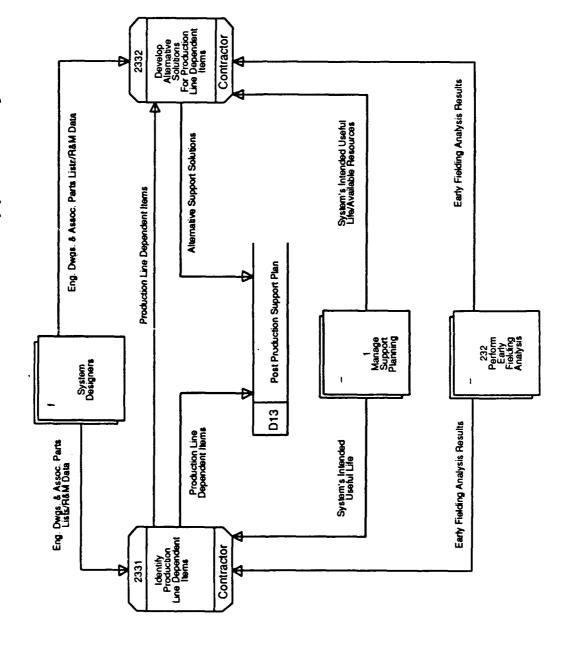
*DATA FLOWS*
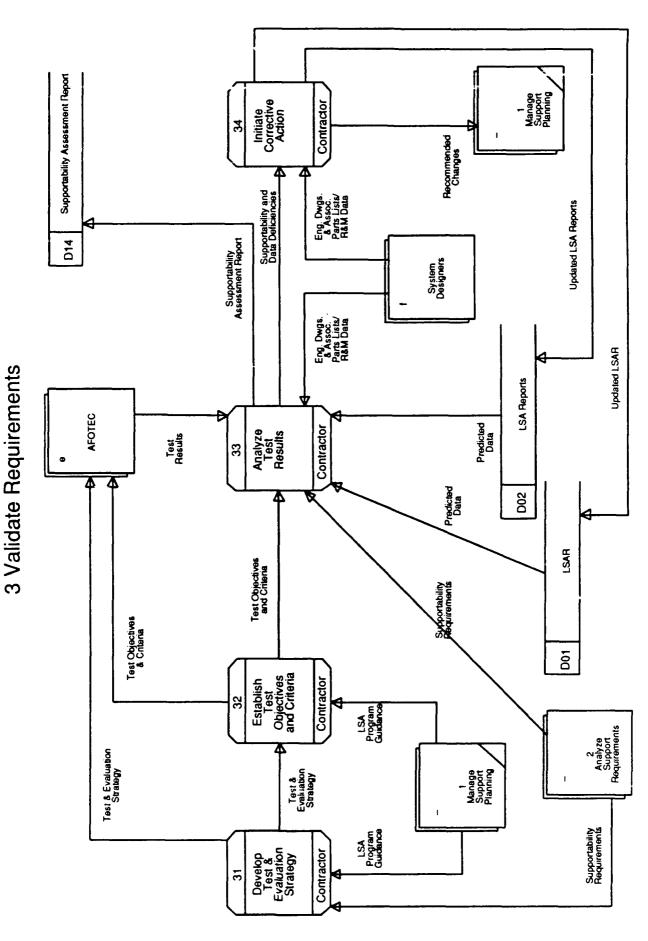
Alternative Support Solutions, Available Resources, Early Fielding Analysis Results, Engineering Drawings and Associated Parts Lists, Production Line Dependent Items, Reliability and Maintainability Data, System's Intended Useful Life.

**B.4.5 Node 3 – Validate Requirements**

Validate Requirements is decomposed into four functions: Develop Test and Evaluation Strategy, Establish Test Objectives and Criteria, Analyze Test Results and Initiate Corrective Action. The process is illustrated in the Node 3 data flow diagram on page B-47.

# 233 Perform Post Production Support Analysis

# 3 Validate Requirements

PROCESSES

*Node 31: Develop Test and Evaluation Strategy*

The Contractor develops a test and evaluation strategy to ensure that specified supportability and supportability related design requirements are met. The task includes trade-off analysis of the planned test length, cost, and potential risks incurred. Test and evaluation results from similar weapon system acquisitions are also analyzed to take advantage of lessons learned.

*Node 32: Establish Test Objectives and Criteria*

In this task, the Contractor establishes test and evaluation program objectives and criteria, and identifies test resources, procedures, and schedules. Program objectives and criteria are identified in quantifiable terms to facilitate the comparison with test results and determine system deficiencies.

*Node 33: Analyze Test Results*

The Contractor analyzes test results against predicted data to determine discrepancies, and develops the Supportability Assessment Report. The report assesses supportability factors measured during testing, evaluates deviations between predicted and tested values for logistics resources for their impact on cost and system readiness, and identifies supportability and data deficiencies for required changes.

*Node 34: Initiate Corrective Action*

The Contractor's analysis of test results against predicted data may result in the need for updates and modifications to both the system design and the logistic resource requirements. The Contractor determines the necessary improvements to the system in terms of readiness, cost, and logistic resource requirements and updates the system support plan, LSA Reports, and the LSAR.

DATA STORES

> D01 LSAR
> D02 LSA Reports
> D14 Supportability Assessment Report

DATA FLOWS

Engineering Drawings and Associated Parts Lists, LSA Program Guidance, Predicted Data, Recommended Changes, Reliability and Maintainability Data, Supportability and Data Deficiencies, Supportability Assessment Report, Supportability Requirements, Test and Evaluation Strategy, Test Objectives and Criteria, Test Results, Updated LSAR, Updated LSA Reports.

## B.5  DATA FLOW DICTIONARY

This section defines the data flows identified in each data flow diagram.

**A Record(s):**
LSA record A contains operations and maintenance requirements for the system under analysis. These requirements are normally developed by the Air Force and documented in the LSAR by the Contractor. Data fields include values for expected number of systems to be supported, number of operating locations, and annual utilization rates of the system.

**All Records:**
All LSA records comprise: A, B, B1, B2, C, D, D1, E, E1, E2, F, G, H, H1, and J records, as defined in MIL-STD-1388-2A.

**Alternative Design Concepts:**
Alternative system design concepts, developed by the Contractor, to minimize the system requirements based on the functional requirements analysis. The concepts are evaluated, a tradeoff analysis made, and the best system for development identified.

**Alternative Support Concepts:**
Complete system level descriptions of various support systems addressing each ILS element, developed by the Contractor. Alternative support concepts are developed to address the functional requirements of alternative systems under consideration. The concepts are evaluated, a tradeoff analysis made, and the best system for development identified.

**Alternative Support Plans:**
Detailed descriptions of support systems covering each ILS element for various system designs under consideration, developed by the Contractor. Support plans cover lower hardware indenture levels and provide more detail of maintenance levels than support concepts.

**Alternative Support Solutions:**
Plans that ensure availability of production line dependent items throughout the system's intended useful life, developed by the Contractor. Analysis is conducted as part of post production support analysis.

**Alternative System's Functional Requirements:**

The operational and support tasks of the alternative system that must be performed to maintain the system in its operational environment. Requirements are developed by the Contractor and are based on the alternative design concepts.

**Analysis Reports:**
Reports include: System/Design Trade Study Reports, Use Study Report, Compara-

tive Analysis Report, Technological Opportunities Report, Early Fielding Analysis Report, and the Post Production Support Plan. Each of these reports are contractor developed and subject to SPO approval.

**Approved LSA Data:**
LSA Reports and records which have been reviewed by appropriate Air Force personnel and determined to be accurate.

**Assessment Data:**
Data collected by the Contractor during requirements validation to identify the approach and criteria used for ensuring system supportability. See the entries for **Supportability Assessment Plan** and **Supportability Assessment Report** for a description of the two reports generated from the assessment data.

**Available Resources:**
Identification of all currently available resources in the possession of the Requiring Authority (MAJCOM) that can be allocated for use on the new weapon system. These resources include: support equipment, bulk items, tools, spare parts, manpower and personnel, facilities, technical data, and computer support. Commonality with currently available support resources is desired for the new weapon systems wherever possible.

**Baseline Comparison System (BCS):**
An existing weapon system or a composite of more than one existing system that is useful for comparison with the new system due to similarities in mission, hardware, and support.

**BCS Characteristics:**
Distinguishing traits that make the BCS useful for comparison. Examples include similar support concepts, hardware, and operating conditions.

**BCS Risks and Assumptions:**
Risks identified and assumptions made when developing the BCS. Examples include a low degree of similarity between certain aspects of the new system, and the BCS or data integrity problems on the BCS.

**BCS Supportability, Cost, and Readiness Drivers:**
Those characteristics of the BCS that have the greatest effect on the system's support cost and availability.

**BCS Supportability Parameters:**
The range of values recorded on the BCS which have a major impact on system support.

**B/C/D Records:**
During the identification of functional requirements, various data elements of the B, C, and D Records are developed by the Contractor. Functional requirements and

FMECA data are used to identify repairable items and operations and maintenance task requirements. The B Record is used to document the item's function, maintenance concept, reliability, maintainability, and FMECA data. Operations and task requirements are identified on the D Record and summarized on the C Record.

**B through J Records:**
The data elements of the B through J Records developed by the Contractor as a result of tradeoff analysis. Functional requirements are documented in the B, C, and D Records and new or critical support items are documented in the E, F, G, H, and J Records. Record B is Item Reliability and Maintainability Characteristics, Record C: Operation and Maintenance Task Summary, Record D: Operation and Maintenance Task Analysis, Record E: Support Equipment or Training Materiel Description and Justification, Record F: Facility Description and Justification, G record: Skill Evaluation and Justification, Record H: Support Items Identification, and Record J: Transportability Engineering Characteristics.

**Comparative Analysis Report:**
The analysis of existing systems, or composites of more than one system, by the Contractor, identifying operating and support costs, logistic resource requirements, reliability and maintainability values of comparable system(s). Supportability problems on comparative systems are identified, as are risks and assumptions associated with the comparative system(s). Data are useful for comparison with the new system with respect to hardware, operational, and/or support similarities. The report also identifies supportability, cost, and readiness drivers for the new system based on the analysis of comparative systems.

**C through J Records:**
Data elements of the C through J Records developed by the Contractor as a result of support resources analysis. These Records are used to record logistics resource requirements of the system. Record C is Operation and Maintenance Task Summary, Record D: Operation and Maintenance Task Analysis, Record E: Support Equipment or Training Materiel Description and Justification, Record F: Facility Description and Justification, Record G: Skill Evaluation and Justification. Record H: Support Items Identification, and Record J: Transportability Engineering Characteristics.

**CDRL's – Contract Data Requirements List:**
Lists of data and information that the Contractor is obligated to deliver to the Air Force.

**Combat Environment Resource Requirements:**
The logistics resources needed to support and operate the system based on projected combat scenarios, system vulnerability, and combat usage.

**Contract Deliverable:**
The DIDs and CDRLs (including all support related data) the Contractor is obligated to deliver to the SPO.

**Contract Requirements:**
Data and information that the Contractor is obligated to deliver to the Air Force.

**Data Updates:**
After Air Force review, rejected data requires corrective action. Inaccuracies are identified and changes made to correct problems in documentation.

**Depot Level Support Data:**
All information required to support the system at the ALC(s). Each ILS element is addressed to ensure that all information required is available.

**Design Change Recommendations:**
An intra–contractor flow of data. As logistics engineers analyze support require-ments, supportability related issues arise based on the system design. Problems identified by the logistics engineer relating to system design must be brought to the attention of the design engineering department for resolution.

**Design Change Requirements:**
Based on a review of LSAR, LSA reports, and the system design, the changes that the SPO, with assistance from the Requiring Authority, ALC, and AFALC, require to be made to the system design to enhance its supportability. If there are no changes, the SPO accepts the current design as a supportable system.

**Design Improvements:**
Identified technological advancements that may be used in the new system to en-hance supportability, increase readiness, and/or reduce logistic resource require-ments.

**Design Objectives:**
Qualitative or quantitative values attributed to system design, representing desirable performance levels based upon an analysis of available technology.

**Disapproved/Unverified Data:**
Data that is not accepted by the Air Force during formal LSA reviews requires corrective action to be taken. Inaccuracies may result from design updates that have not been incorporated, changes in Air Force support requirements, or when Contrac-tor and Air Force personnel verify data versus hardware when available. As test results become available, updates may be required to the LSA data, support require-ments, weapon system design, or a combination of all three.

**Documentation Inaccuracies:**
Incorrect data contained in LSA reports or LSAR that is not related to design or

support concept changes. Typographical errors are an example of documentation inaccuracies.

**Early Fielding Analysis Results/Report:**
An impact assessment of the new system introduction on other, already fielded, systems. Supply, maintenance, and transportation system impacts are assessed and logistic resource requirements for a combat environment identified.

**E/F/G/H/J Records:**
The new or critical support items identified by the Cont ctor as a result of tradeoff analysis. Record E is the Support Equipment or Training Materiel Description and Justification, Record F: Facility Description and Justification, Record G: Skill Evaluation and Justification, Record H: Support Items Identification and Record J: Transportability Engineering Characteristics.

**Engineering Drawings and Associated Parts Lists:**
The primary source data to the support planning process. The data depicts the system design on which support planning is performed. Analysis of engineering drawings and associated parts lists results in design change requirements and identification of logistics resource requirements.

**Evaluation and Tradeoff Results:**
Conclusions which optimize supportability as a product of analyzing various support options.

**Existing Comparable Systems:**
Currently fielded systems similar to the new system, that are useful for comparing support, hardware, and/or operations.

**Existing System Impacts:**
Changes imposed on currently fielded weapon, supply, maintenance, and transportation systems as a result of introducing the new system to the field.

**Facilities Requirements:**
The permanent or semi-permanent real property assets to support the system.

**Field Visit Locations:**
Field visit locations which most closely represent the intended operational and support environment of the new system.

**Field Visits Reports:**
Detailed information documented in the Use Study on system supportability. The report is developed by the Contractor when investigating the operational and support locations of the system.

**FMECA Data**
The FMECA data identifies the failure modes of the system, the possible effects of

each failure, and the criticality of each failure to mission completion. FMECA data identifies corrective maintenance requirements of the system.

**Functional Requirements:**
The operational and support tasks that must be performed to maintain the system in its operational environment.

**Functional Requirements Risks:**
The chance of an unexpected outcome related to the operational and support tasks of the system.

**Guidance:**
Support planning program assistance given to the Contractor by the SPO. The SPO furnishes information related to the planned operation of the system, its maintenance and operational environment; determines the analysis priorities; furnishes lists of available support resources, and tailors MIL-STD-1388 to meet the weapon system's requirements.

**Hardware and Software Standardization Recommendations:**
Information developed to assist system designers in meeting uniformity requirements.

**Hardware and Software Standardization Related Supportability Characteristics:**
Aspects of the system design related to uniformity that have the greatest effect on system support.

**Hardware and Software Standardization Requirements:**
System design constraints levied by the Air Force to control uniformity in system support among weapon systems.

**ILSP – Integrated Logistics Support Plan:**
The resource requirements, tasks, and schedules of the system's ILS program, developed by the SPO as part of the Program Management Plan. The ILSP defines the Air Force's approach to ensure that ILS objectives are achieved.

**Intended Mission and Use Information:**
A description of the new system's operating and supporting environments, support locations, and applications.

**Intended Use Information:**
Operating and supporting information related to the system's function and operating environment, developed by the Contractor as part of the Use Study Report. The information assists the Contractor in developing hardware and software standardization approaches.

**LSAP – Logistics Support Analysis Plan:**
The tasks and the schedules of the system's LSA program, developed by the Con-

tractor. The LSAP outlines organizational responsibilities and describes data product requirements.

**LSA Program Guidance:**
The required tasks, outputs, and schedules of the Contractor's analytical functions.

**LSA Program Requirements:**
The LSA program outputs, tasks, and schedules imposed on the contractor by the Air Force.

**LSA Strategy:**
The strategy developed by the SPO to identify the most cost effective LSA tasks for the system being developed.

**LSAR/LSA Reports:**
All data developed by the Contractor during the LSA program.

**Manpower and Personnel Sources:**
Existing programs and new areas from which the necessary military and civilian personnel are supplied to operate and support the new system.

**Manpower Requirements:**
The necessary military and civilian personnel, broken down by skill and grade needed to operate and support the system at peacetime or wartime rates.

**Measured Data:**
Data developed by AFOTEC during operational testing. Data are used by the Contractor to validate the logistics resource requirements of the weapon system that were predicted by the Contractor as part of the Analyze Support Requirements function.

**Milestone Review Checklists:**
The review made by AFALC, under orders from the SPO, of the Contractor's progress at the various life cycle milestones. AFALC maintains Milestone Checklists for each of the applicable ILS elements that are to be scrutinized at the end of each system life cycle phase (Concept Development, Demonstration/Validation, Full Scale Development, and Production/Deployment). The contractor must adequately answer each of the issues addressed on the checklists to be allowed to continue to the next phase.

**Mission and Functional Requirements:**
The requirements identified in the Statement of Need (SON) by the Requiring Authority in response to perceived security threats. The Requiring Authority identifies a mission need in response to perceived security threats. Examples of Mission requirements include minimum payload and flight range for an aircraft. Functional requirements include a description of the task or the use for the weapon system.

**NATO Constraints:**
Restrictions imposed on the system due to NATO requirements.

**Negative Existing System Impacts:**
The detrimental changes realized by currently fielded weapon and support systems by the fielding of the new system.

**Non-Standard Parts Approval Requests:**
A request by the Contractor, subject to SPO approval, for items not originally acceptable. The request must contain justification for use of these items.

**Operations and Maintenance Task Requirements:**
Functions necessary to properly utilize the new system, identified by the Contractor

**Organizational and Intermediate Level Support Data:**
Operational and maintenance data required by the MAJCOM at the field or base level to ensure proper availability of the system. Each element of ILS is addressed to ensure that all information required is available.

**Parts Control Reports:**
The reports generated during hardware standardization analysis: Parts Control Program Plan, Program Parts Selection List (PPSL), Non-Standard Parts Approval Requests/Proposed Additions to an Approved PPSL, Military Detail Specifications and Specification Sheets, and Test Data for Non-Standard Parts.

**Plans/Updates:**
The plans that provide the baseline for control of the weapon system's support planning process. These plans include the: PMP, ILSP, ISP, LSAP, and TEMP. All require updating throughout the acquisition phases.

**Post Production Support Plan:**
A Contractor developed report governed by DI-P-7119 identifying items that may present availability problems once a production line is shut down. Alternatives and a recommended plan of action to ensure that these production line dependent items are available throughout the system's life are developed and included in the plan.

**Predicted Data:**
Data developed via the LSA process is predicted data until it can be measured during the validation of requirements. Predicted data includes maintenance task descriptions, failure data, and logistics resource requirements.

**Preferred Parts Lists:**
Lists of items identified by the Air Force as more desirable than other items due to standardization, reliability, maintainability, or cost considerations.

**Previous Systems Data:**
Relevant data on currently fielded systems that are similar to the new system. Used by the Contractor when performing comparative analysis.

**Procedural Task Descriptions:**
Step by step narratives documenting operations and maintenance functions.

**Production Line Dependent Items:**
Unique items that may pose availability problems once the production line used for their manufacture has been shut down.

**Program Guidelines:**
Guidelines derived from the various weapon system's plans that are used to monitor and control the support planning process. Supportability criteria and systems requirements are identified to properly address supportability problems and recommended changes in the weapon system design or support structure.

**Provisioning Requirements:**
Necessary type and quantities of support and test equipment, spares, and repair parts, to operate and support the system.

**Qualitative Supportability Factors:**
Characteristics of system design that are directly attributable to meeting peacetime and wartime operational requirements.

**Qualitative Supportability Problems:**
Characteristics of system design that are directly attributable to not meeting peacetime and wartime operational requirements.

**Quantified Supportability Factors:**
Measurable values of the degree to which design characteristics meet peacetime and wartime operational requirements.

**Recommended Design Alternatives:**
Alternative system design characteristics, identified by the Contractor, that are desirable due to their supportability characteristics.

**Recommended Design Specifications:**
Detailed description of the recommended system developed by the Contractor. Recommendations are based on current technological advances, system supportability, and cost considerations.

**Recommended New Action:**
The recommended action to resolve the supportability problems and reject data identified by the Contractor as a result of formal review.

**Recommended Solutions:**
The recommended solutions developed by the Contractor in response to problems identified during early fielding analysis. Negative impacts on existing systems and resource shortfalls are analyzed and corrected.

**Recommended Support Plan:**
A detailed description of the recommended support system addressing each of the

ILS elements. The plan is developed by the Contractor when evaluating alternatives. Recommendations are based on readiness and/or cost considerations.

**Recommended Support System:**
The most desirable composite of all the resources that must be acquired for operating and maintaining the system throughout its life cycle.

**Rejected Data:**
Data reviewed by appropriate Air Force personnel and not approved.

**Reliability and Maintainability Data:**
Design parameters of the system that influence both system performance and costs. These parameters include mission effectiveness, system availability, logistics support requirements, and life cycle cost.

**Requirements Implications:**
Identified system requirements that warrant closer scrutiny to determine if they are attainable.

**Resolved Supportability Problems:**
System deficiencies that are corrected using program guidelines.

**Resource Requirements:**
The materiel and personnel elements needed to maintain and operate the system at desired levels of maintenance.

**Resources Required per Task:**
The amount and type of materiel and personnel necessary to complete a given function.

**Results Evaluation:**
The findings when test or actual data is run against predicted system data. Discrepancies are recorded when identified

**Review Agenda:**
The list of specific data products for each LSA review, identified by the Contractor. The Contractor prepares and distributes the appropriate data products to the required Air Force organizations prior to formal review.

**Review Procedures and Schedules:**
The general guidelines for the conduct of LSA reviews, developed by the SPO. Procedures identify all Air Force organizations required to attend review meetings. Schedules identify when the reviews take place.

**RFP Recommendations:**
RFP Recommendations identify specific DIDs and CDRLs to put on contract. The objective is to reduce the overlap in DIDs and CDRLs. The overlap must be minimized to preclude purchasing the same data more than once while ensuring that all required data is acquired.

**Sensitivity Analysis Results:**
The amount by which model parameter estimates can be in error before the chosen alternative is no longer optimum.

**Skill Requirements:**
The skill levels/personnel needed to support the new system. Requirements, received by the SPO from the contractor, are sent to Air Training Command who identify current deficiencies in skill levels/personnel, and develop additional training courses as required.

**Standardization Approaches:**
Contractor developed plans to attain hardware and software uniformity requirements.

**Standardization Constraints:**
Uniformity restrictions on system hardware and software.

**Standardization Risks:**
The chance of an uncertain outcome related to hardware and software uniformity requirements.

**Support Alternative Risks:**
The chance of an unexpected outcome associated with each support alternative developed.

**Support Alternatives:**
Various composites of all resources required for operating and maintaining the system.

**Support Data:**
Data required to maintain the weapon system acquired by the Requiring Authority and the Supporting Commands. Each ILS element is addressed to ensure that all required data is available. This support data is found in the form of DIDs and CDRLs, as required by contract.

**Support Drivers:**
Those characteristics of the system which have the greatest effect on the system's supportability.

**Support Equipment Requirements:**
All end items (excluding the system itself) needed to maintain and operate the system.

**Support Resources Problems:**
Logistic resources, identified by the Contractor, that are unavailable, need modification, or need development.

**Support Resources Reports:**
Reports developed by the Contractor when determining logistics resource require-

ments. They include: System/Design Trade Study Reports, Early Fielding Analysis Report, and the Post Production Support Plan.

**Support System Problems:**
Difficulties encountered when defining the support system required for operating and maintaining the system throughout its life cycle.

**Support System Risks:**
The chance of an uncertain outcome related to each support alternative under consideration.

**Support Systems Analysis:**
A detailed examination of design to develop a composite of all resources required to operate and maintain the system.

**Support Systems Reports:**
Reports developed by the Contractor when determining supportability recommendations. They include: Parts Control reports, Use Study Report, Comparative Analysis Report, Technological Opportunities Report, and various System/Design Trade Study reports.

**Supportability and Data Deficiencies:**
Identified problems in LSA documentation and system design support characteristics.

**Supportability Assessment Report:**
A Contractor developed report governed by DI-S-7121 that provides the results of a validation of supportability data developed during requirements analysis. The report assesses supportability factors measured during testing, evaluates deviations between predicted and tested logistics resources values for their impact on cost and system readiness, and makes recommendations for improving supportability. The report is often generated from AFOTEC involvement in operational testing. AFOTEC is contracted by the SPO to perform system testing to validate predicted data versus system specifications, in accordance with the TEMP.

**Supportability Characteristics:**
Traits that determine the ability of the system to meet peacetime and wartime utilization requirements.

**Supportability Constraints:**
Restrictions placed on the design and support system due to peacetime and wartime utilization requirements.

**Supportability, Cost, and Readiness Drivers:**
System characteristics that have the greatest effect on the system's life cycle cost and availability.

**Supportability Goals and Thresholds:**
Values, or a range of values, and the minimum values allowable for various aspects of system design to meet peacetime and wartime utilization requirements.

**Supportability Implications:**
Design and support system deficiencies directly attributable to the weapon system not meeting peacetime and wartime utilization requirements.

**Supportability Objectives and Risks:**
Qualitative and quantitative values for various system elements that describe desirable levels of peacetime and wartime system availability and the chances of not attaining these levels.

**Supportability Problems:**
Examples of supportability related problems incurred by the Contractor include: inability for certain maintainability requirements to be met without adversely affecting system reliability; necessity to use non-standard tools or parts in order to meet other support requirements. Problems must be reported in a timely fashion to the SPO to initiate corrective action. Waiver of certain support requirements will be granted by the SPO only after all possible alternatives have been exhausted.

**Supportability Recommendations:**
Aspects of the support system and design that are desirable due to life cycle cost and availability considerations.

**Supportability Related Design Constraints:**
Restrictions placed on system design due to system peacetime and wartime utilization requirements.

**Supportability Related Design Factors:**
The degree to which system design meets peacetime and wartime utilization requirements.

**Supportability Requirements:**
Necessary levels of availability that system design characteristics and logistics resource requirements must attain.

**System Design Deficiencies:**
Design shortfalls that preclude the system from meeting supportability requirements.

**System/Design Trade Study Reports:**
Contractor developed reports governed by DI-S-3606 used to document the decision rationale for designated trade studies.

**System Design Updates:**
Changes in design to meet supportability requirements.

**System Readiness Impacts:**
Description of the effects experienced during early fielding of the system due to logistic resource shortfalls.

**System Requirements Deficiencies:**
Supportability or performance needs imposed by the Air Force that the system is unable to meet with the currently available resources and technology.

**System Requirements Updates:**
Changes in system requirements due to inability for design to meet requirements or the need for increased performance or support requirements.

**System Utilization Estimates:**
The amount that the system is planned on being used. Estimates are made for both peacetime and wartime usage.

**System's Intended Application:**
The planned use and support of the system to assist the development of a baseline comparison system.

**System's Intended Useful Life:**
The estimated length of time that the system is to be fielded.

**Technological Opportunities Report:**
The Technological Opportunities Report is a Contractor developed report governed by DI-S-7117. The purpose of this report is to identify design opportunities which can be incorporated into the new system in order to improve supportability. Design improvements which have the potential for reducing logistic support resource requirements, reducing costs, or increasing system availability are identified. Estimated costs for implementing these design improvements and schedule impacts are identified.

**Technology Advancements:**
Design or support system improvements that have the potential for reducing life cycle cost or increasing system availability.

**Technology Related Risks:**
The chance of an uncertain outcome attributable to use of the latest technology available.

**Test and Evaluation Master Plan (TEMP):**
The TEMP describes the type and amount of testing to be conducted before each milestone and the resources required for such tests. The Program Manager is responsible for the development of the TEMP with assistance from AFOTEC as required. The TEMP includes both Development, Test, and Evaluation (DT&E) and Operational Test and Evaluation (OT&E) schedules and requirements.

**Test Results:**

During Operational Test and Evaluation, AFOTEC analyzes all predicted support data and support requirements as they relate to system specifications and the TEMP. Test results will be analyzed by the SPO to ensure that all requirements are met.

**Test Strategy/Criteria:**

Plan of action for the test program and standards developed to ensure proper system performance.

**Trade Study Analysis:**

The systematic examination of support alternatives that optimize the balance between life cycle cost and system availability.

**Trade Study Reports:**

Contractor developed reports that document the results of support alternative evaluations.

**Tradeoff Analysis:**

Detailed support and design examination to determine the optimum balance among life cycle cost, schedule, performance, and supportability.

**Tradeoff Criteria:**

Standards used for determination of the optimum balance among life cycle cost, schedule, performance, and supportability.

**Tradeoff Results:**

Conclusions reached during support and design analysis to optimize life cycle cost, schedule, performance, and supportability considerations.

**Transportability Requirements:**

The attributes necessary for material to be moved. Examples include environmental considerations, vehicle type, shock and vibration fragility, and special equipment requirements for the movement of personnel and/or equipment.

**Training Policy:**

ATC provides training requirements guidance to the SPO as required. The training policy established by the ATC ensures that trained personnel are available to operate and maintain the weapon system. This training policy includes training cost information that is used for tradeoff analysis.

**Training Programs:**

ATC designs training programs to provide individuals with the skills required for successful performance of their job. These programs may be formal classroom programs or informal on the job programs depending on the skill required.

**Training Related Support Data:**

Training related support data includes identification of the processes, procedures,

techniques, and equipment required to train personnel to operate and support the system.

**Unique System Drivers:**
Characteristics of the system that have the greatest effect on the system's life cycle cost and availability, for which there are no systems available for comparison.

**Unresolved Supportability Problems:**
Supportability problems, identified by the Contractor through analysis of support requirements, that cannot be resolved using normal program guidelines as specified in the various weapon system plans. Problems are examined individually and corrective action taken.

**Unverified Data:**
LSA data analyzed against available hardware that is rejected at LSA reviews.

**Updated LSAR:**
LSAR data that has been validated through comparisons with test data and changed to reflect any discrepancies between predicted and actual values.

**Updated LSA Reports:**
LSA Reports that have been validated through comparisons with test data and changed to reflect any discrepancies between predicted and actual values.

**Use Related Supportability Factors:**
The qualitative and quantitative degrees to which system design meets peacetime and wartime utilization requirements that are directly attributable to the system's intended application.

**Use Related Supportability Parameters:**
Measurable values of the degree to which design characteristics meet peacetime and wartime operational and support requirements that are directly attributable to the system's intended application.

**Use Study Report:**
A Contractor developed report governed by DI-S-7115. Included in the report are quantitative values for operating times, frequency of operations, type of operations, number of systems supported, allowable maintenance periods, and environmental requirements. Operational and support data from field visits are also included.

**Verified Data:**
Data that has been approved by the Air Force and verified versus hardware when possible is considered verified data. This data (consisting of LSAR and LSA Reports) is accepted by the Air Force and becomes part of the Air Force database.

## B.6 EXTERNAL ENTITIES:

This section describes the organizations (external entities) identified in each data flow diagram.

### AFALC:

AFALC, a component of AFLC, provides the interface between AFSC and AFLC. AFALC is located at Wright Patterson AFB with personnel assigned to various SPOs. AFALC functions as a consultant, providing support to the SPO for RFP preparation and milestone review.

### AFOTEC:

AFOTEC is the independent test agency within the Air Force responsible for testing new systems being developed for Air Force and multiservice use, under operationally realistic conditions. AFOTEC performs tests in accordance with the TEMP to ensure that the weapon system adheres to specifications, then forwards test results to the SPO for assessment.

### ALC:

ALCs are the primary installations within AFLC. These centers provide logistics support for a variety of weapon systems. There are five ALCs from which to source supply and repair for specific weapon systems. ALCs require depot level support data produced via LSA to perform their stated function.

### ATC:

ATC implements LSA policies and procedures relating to training and training support, develops training courses as required to satisfy the requirements of record G, and provides training cost information to the SPO for use in trade off studies.

### Requiring Authority:

The Requiring Authority is usually a MAJCOM (MAC, TAC, SAC), that operates the weapon system being acquired. In response to a perceived threat, the Requiring Authority develops mission and functional requirements for the new weapon system. The MAJCOM provides operational and for base level support

### System Designers:

The contractor developed weapon system design is the primary data source for LSA. This entity includes the contractor's design engineering staff as well as all design products developed by the contractor.

## B.7 DATA STORES

This section summarizes the data stores identified in each data flow diagram.

**D01: LSAR:**
The LSA records include:

  Record A: Operations and Maintenance Requirements
  Record B: Item Reliability and Maintainability Characteristics
  Record B1: Failure Mode and Effects Analysis
  Record B2: Criticality and Maintainability Analysis
  Record C: Operation and Maintenance Task Summary
  Record D: Operation and Maintenance Task Analysis
  Record D1: Personnel and Support Requirements
  Record E: Support Equipment or Training Materiel Description and Justification
  Record E1: Support Equipment or Training Materiel Description and Justification – Continued
  Record E2: Unit Under Test and Automatic Test Program(s) Description
  Record F: Facility Description and Justification
  Record G: Skill Evaluation and Justification
  Record H: Support Items Identification
  Record H1: Support Items Identification (Application Related)
  Record J: Transportability Engineering Characteristics

The A record is developed to identify operation and maintenance requirements that must be met by the contractor's weapon system design. The remaining records identify in quantitative terms the support resources needed to maintain the fielded system. All records are developed by the Contractor.

**D02: LSA Reports:**
LSA Reports Include:

  Use Study Report
  System/Design Trade Study Reports
  Technological Opportunities Report
  Comparative Analysis Report
  Early Fielding Analysis Report
  Post Production Support Plan
  Supportability Assessment Plan
  Supportability Assessment Report

**D03: Plans and Updates:**
The following plans are developed to control the support planning process:
  Program Management Plan (PMP)
  Integrated Logistics Support Plan (ILSP)
  Integrated Support Plan (ISP)
  Logistics Support Analysis Plan (LSAP)
  Test and Evaluation Master Plan (TEMP)

**D04: Review Procedures and Schedules:**
Review procedures and schedules are developed to guide the conduct of LSA reviews. Location, time, date, purpose, and objectives of each forthcoming LSA review are identified. Specific data for review is identified in review agenda when available.

**D05: Accepted LSAR:**
LSAR which has been reviewed by appropriate Air Force personnel and been approved and verified. When accepted the records becomes part of the Air Force database.

**D06: Accepted LSA Reports:**
LSA Reports that have been reviewed, approved, and verified by appropriate Air Force personnel. When accepted the report becomes part of the Air Force database.

**D07: Use Study Report:**
A Contractor developed report governed by DI-S-7115. Included in the report are quantitative values for operating times, frequency of operations, type of operations, number of systems supported, allowable maintenance periods, and environmental requirements. Operational and support data from field visits are also included.

**D08: Parts Control Reports:**
Contractor developed reports governed by MIL-STD-965 and DI-E-7026 through DI-E-7030 comprise the: Parts Control Program Plan, Program Parts Selection List, Non-Standard Parts Approval Requests/Proposed Additions to an Approved Program Parts Selection List, Military Detail Specifications and Specification Sheets, and Test Data for Non-Standard Parts.

**D09: System/Design Trade Study Reports:**
Contractor developed reports governed by DI-S-3606. These reports are used to document the decision making rationale for designated trade studies.

**D10: Comparative Analysis Report:**

A Contractor developed report governed by DI-S-7116 that analyzes existing systems, or composites of more than one system. Included in the report are operating and support costs, reliability and maintainability values of comparable system(s), and logistic resource requirements. Supportability problems on comparative systems are identified, as are risks and assumptions associated with the comparative system(s). Data are useful for comparison with the new system with respect to hardware, operational, and/or support similarities. The report also identifies supportability, cost, and readiness drivers for the new system based on the analysis of comparative systems.

**D11: Technological Opportunities Report:**

A Contractor developed report governed by DI-S-7116 identifying design opportunities that can be incorporated into the new system to improve supportability. Such improvements include reducing logistic support resource requirements and costs, and increasing system availability. Estimated costs for implementing these design improvements and schedule impacts are identified.

**D12: Early Fielding Analysis Report:**

A Contractor developed report governed by DI-S-7118 that provides an impact assessment of the new system introduction on other, already fielded, systems. Supply, maintenance, and transportation system impacts are assessed and logistic resource requirements for a combat environment identified.

**D13: Post Production Support Plan:**

A Contractor developed report governed by DI-P-7119 identifying items that may present availability problems once the production line is shut down. Alternatives and a recommended plan of action to ensure that these production line dependent items are available throughout the system's life are developed and included in the plan.

**D14: Supportability Assessment Report:**

A Contractor developed report governed by DI-S-7121 that provides the results of a validation of supportability data developed during requirements analysis. The report assesses supportability factors measured during testing, evaluates deviations between predicted and tested logistics resources values for their impact on cost and system readiness, and makes recommendations for improving supportability. The report is often generated from AFOTEC involvement in operational testing. AFOTEC is contracted by the SPO to perform system testing to validate predicted data versus system specifications, in accordance with the Test and Evaluation Mas-

ter Plan (TEMP).

### D15: A Record:

LSA record A contains operations and maintenance requirements for the system under analysis. These requirements are normally developed by the Air Force and documented in the LSAR by the Contractor. Data fields include values for expected number of systems to be supported, number of operating locations, and annual utilization rates of the system.

### D16: B/C/D Records:

During the identification of functional requirements, various data elements of the B, C, and D Records are developed by the Contractor. Functional requirements and FMECA data are used to identify repairable items and operations and maintenance task requirements. A B Record is developed for each repairable item, while operations and task requirements are identified on the D Record and summarized on the C Record.

### D17: E/F/G/J Records:

The new or critical support items identified by the Contractor as a result of tradeoff analysis.

### D18: C/D Records:

During the identification of functional requirements, various data elements of the C and D Records are developed by the Contractor. Functional requirements and FMECA data are used to identify repairable items and operations and maintenance task requirements. The D record co ins procedural task descriptions as well as identification of all logistic resources required to complete each task. The C Record is a summary of the operations and maintenance tasks documented on the D Records.

### D19: H Records:

Contractor developed records identifying support items. These data include: Source, Maintenance, and Recoverability (SMR) codes, cost, storage, distribution, and part application information.

### D20: G Records:

Contractor developed records identifying new or modified skill requirements for system operation and support. The records identify rank, security, and grade requirements for functions to be performed that are new or modified.

**D21: E Records:**

Contractor developed records identifying support equipment or training material requirements. Use requirements and support equipment specifications are identified and justifications developed for each item.

**D22: F Records:**

Contractor developed records identifying support facility requirements, facility design criteria, lead times for facilities construction, construction justification, and cost rationale.

**D23: J Records:**

Contractor developed records identifying the transportability engineering requirements of an end item. Transportability parameters include environmental considerations, special equipment requirements, vehicle type, shock and vibration fragility.

# APPENDIX C

# ORGANIZATIONAL ENVIRONMENT FOR LOGISTICS SUPPORT ANALYSIS

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# APPENDIX C
# ORGANIZATIONAL ENVIRONMENT FOR LOGISTICS SUPPORT ANALYSIS

## C.1 INTRODUCTION

Logistics Support Analysis (LSA) is the selective application of scientific and engineering efforts undertaken during the weapon system's acquisition, as part of the systems engineering and design process. The objectives of the LSA process are to integrate supportability requirements into the systems engineering and design process, define the optimal support requirements, define the required operational support and resources, and develop an integrated data base of logistics–related engineering information. The LSA process is governed by MIL–STD–1388–1A and is described in Volume 1 of this report.

One of the principal tasks in the LSA modular planning effort is to identify and describe the existing environments in which the LSA is being implemented, to identify the principal Air Force organizations responsible for the implementation of LSA, and to describe the roles those organizations play in the LSA process. An understanding of the role of these organizations is critical to the modular planning process as well as to the successful implementation of the plans which result from that process.

### C.1.1 Rationale and Purpose

The purpose of the Air Force organizational environment assessment is to describe the organizational context within which LSA is implemented, and to show the participation of key Air Force organizations in the LSA process. A depiction of the current environment accomplishes the following:

- Clarifies the responsibilities of various Air Force organizations in the planning, specification, acquisition, management, transfer, and utilization of LSA/LSAR data;

- Provides a background for the identification of LSA user requirements and for the specification of those requirements in terms of the mission of those Air Force organizations affected by LSA; and

- Provides a benchmark for the identification of constituencies which may use LSA/LSAR data in the future environment.

The organizational assessment is meant to be a reference document to be consulted on an as–needed basis. It is intended to be used in conjunction with the IDEF$_0$ models (Appendix A) and the LSA Support Planning Data Flow Diagrams (Appendix B) to provide a context for the development of an LSA Automation Plan.

## C.1.2 Method

Documentary analysis and site visits/interviews were employed to collect the data necessary for the analysis of the LSA organizational environment. The documentary analysis consisted of a review of Air Force acquisition regulations, mission and organization regulations, and other documentation relevant to LSA. A list of these documents is presented in the Reference section following this appendix. Much of the narrative description which follows is drawn directly from these sources and is presented here for the convenience of the reader.

Site visits and extensive interviews were conducted with representatives of the following organizations: Air Force Logistics Command (AFLC)/HQ, Air Force Acquisition Logistics Center (AFALC), Sacramento Air Logistics Center (SM/ALC), Air Force Systems Command/System Program Office (AFSC/SPOs C-17, B-1B, ATF, JointSTARS), Air Force Systems Command/Aeronautical Systems Division (AFSC/ASD) and Electronic Systems Division (ESD), Military Airlift Command (MAC)/HQ, Air Force Space Command and at Contractor facilities (Martin-Marietta and Grumman Melbourne Systems Division). Additional interviews were conducted with several Air Force organizations and at professional meetings, including those of the National Security Industry Association (NSIA), the Air Force-Industry Conference, the Industrial Working Group, and the CALS Automation Working Group. A more detailed list of contacts is provided in the Reference section following this appendix. At these meetings, organizational issues affecting the performance of LSA and its use by Air Force and Contractor organizations were discussed.

## C.1.3 Scope

The organizational assessment focused on those Air Force organizations principally involved with LSA and/or the LSAR data; these are:

- Air Force Systems Command (the SPO and the Air Force Contract Management Division);

- The major Using Commands; and

- Air Force Logistics Command, the Aerospace Guidance and Metrology Center (AGMC), AFALC, and the ALCs.

The role in LSA of Air Training Command (ATC), the Air Force Operational Test and Evaluation Center (AFOTEC) and the AGMC are also discussed. Since the Contractor role is central in the LSA process, a consideration of that role has also been included in the analysis. The discussion of the organizational roles and responsibilities for each of the organizations identified in this report includes only those roles and responsibilities pertaining to LSA. Since LSA documentation is used to provide information to Integrated Logistics Support (ILS), the role of these organizations in ILS is also discussed.

## C.1.4  Organization

Section C.2 contains a summary of the organizational roles and responsibilities specified in various Air Force regulations and a description of the key personnel involved in LSA. Section C.3 contains a series of matrices that map LSA tasks to Air Force organizations and graphically depict the LSA–related functions of each organization. Section C.4 presents the summary. Organizational issues relating to LSA automation and automation planning that emerged from site visits and interviews are discussed in Volume I of this report.

## C.2  ORGANIZATIONAL ROLES AND RESPONSIBILITIES

The specific roles and responsibilities of Air Force organizations for implementing LSA are defined in a number of Air Force Regulations and other documents. These documents are referenced in the section following this appendix. The interaction of these organizations in the LSA process and the flow of data between these organizations is depicted and described in the Data Flow Diagrams (Appendix B).

### C.2.1  Department of the Air Force

The Air Force is divided into a Headquarters organization and three field organizations. See Figure C-1. Headquarters consists of the Secretariat and the Air Staff. The Field consists of the thirteen Major Commands (MAJCOMs), thirteen Separate Operating Agencies (SOAs), and eight Direct Reporting Units (DRUs). Figure C-2 identifies the Air Force field organizations that play major roles in the LSA process.
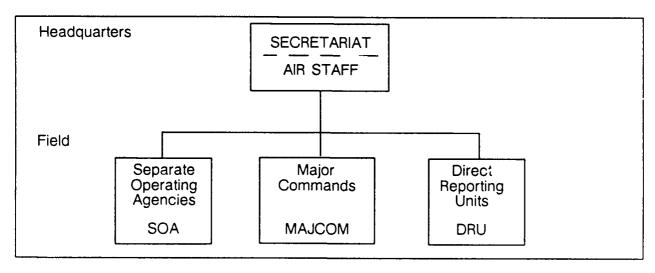


FIGURE C-1.  AIR FORCE ORGANIZATION

HQ USAF initiates a weapon system acquisition or major modification by preparing the Program Management Directive (PMD) that authorizes a program initiation and designates the Implementing and Supporting Commands for any acquisition or modification.
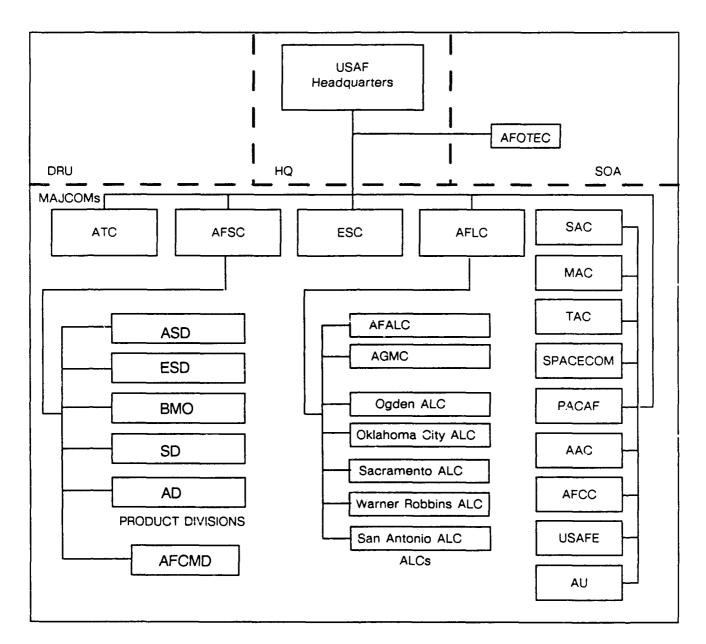
FIGURE C-2. AIR FORCE ORGANIZATIONS INVOLVED IN LSA

The responsibilities of these Commands are discussed below. HQ USAF also specifies the responsibilities of each of these commands in supporting the program and governs the particular acquisition effort. HQ USAF, through the PMD and supplements, and the Program Manager's (PM) charter, defines the PM's specific responsibility, authority, and accountability for attaining program objectives. HQ USAF also coordinates all LSA waiver requests and provides final approval for waivers of LSA application; coordinates Air Force LSA policy; and coordinates budgeting and funding requests for LSA programs. The HQ USAF maintains an Office of Primary Responsibility (OPR) for LSA that coordinates budgeting and funding requirements for LSA programs.

C-6

Responsibility for weapon system acquisition or modification is shared between three MAJCOMs within the Air Force: the Implementing Command, Supporting Command(s), and Using Command(s). These are depicted in Figure C-3.
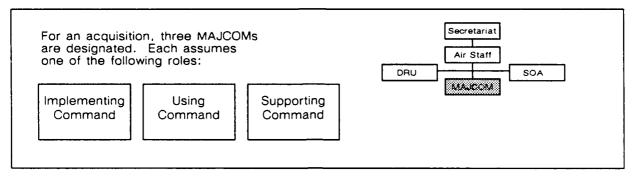


FIGURE C-3.  MAJCOM ROLES IN ACQUISITION

## C.2.2  Implementing Command

The Implementing Command (usually AFSC) is the MAJCOM designated by HQ USAF to manage an acquisition or major modification, and is the lead command for implementing LSA policy and procedures.  AFSC consists of a number of divisions, centers and laboratories as depicted in Figure C-4.  The Implementing Command assigns responsibility for LSA program implementation to the PM; these are discussed in Section C.2.6. Implementing Command responsibilities for LSA are as follows:

- Designate an OPR for ILS policy and implementation;
- Implement ILS policies and procedures jointly with the Supporting  Command;
- Program, budget, and allocate resources to implement ILS policies and program requirements;
- Establish the SPO;
- Assign responsibility for implementing the ILS program to the PM;
- Develop an acquisition strategy;
- Review and coordinate Supporting Command requests for LSA program waivers and forward these requests to HQ USAF for disposition;
- Coordinate budgeting and funding requirements for LSA programs;
- Develop, in conjunction with the Supporting Command, directives and guidance documents that implement the Air Force LSA program;
- Develop training policy in conjunction with HQ AFLC and ATC to train staff and program management personnel in LSA policy and procedures;
- Identify documents and submit Lessons Learned on LSA implementation;
- Ensure that policies and procedures relating to acquisition programs are compatible with the LSA process;

- Ensure that LSA, Life Cycle Cost (LCC), and Integrated Logistics Support (ILS) policies are compatible and complementary; and

- Provide representative(s) to serve on the LSA Technical Steering Group.
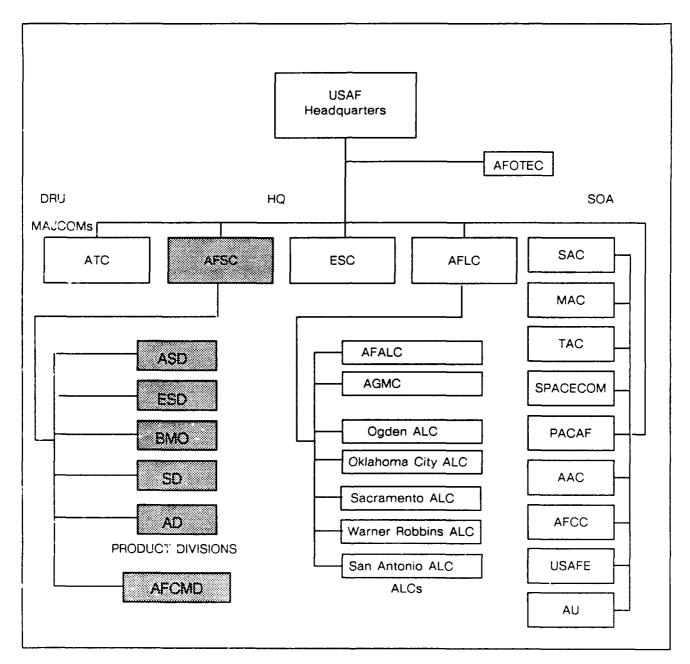


FIGURE C-4.  AFSC ORGANIZATION

Within the Implementing Command, there are two organizations responsible for weapon system acquisitions or modification: the SPO and the Air Force Contract Management Division (AFCMD).

## C.2.2.1 System Program Office (SPO)

The SPO is the agency within the Implementing Command (usually a product division within AFSC) that is principally responsible for managing and coordinating the weapon system acquisition process. Under the direction of the PM, the SPO has a full time staff of technical, business management, and administration personnel responsible for planning, developing, managing, monitoring, supervising, and receiving all phases of the LSA program. This staff may be augmented with additional personnel from other participating organizations. Each product division has one SPO for each acquisition or major modification (See Figure C-5.) The SPO may be established as early in the acquisition cycle as concept exploration, but often is not established until demonstration/validation or full scale development.
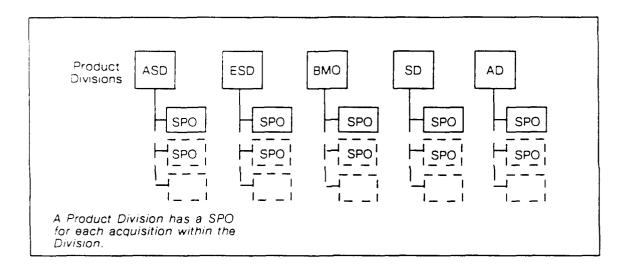


FIGURE C-5. SPO/PRODUCT DIVISION RELATIONSHIP

In some acquisitions the SPO establishes an organization called a Resident Integrated Logistics Support Activity (RILSA). A RILSA is a cadre of highly qualified acquisition, logistics, engineering and technical personnel who are colocated at a contractor's facility for a particular acquisition. The RILSA functions as an extension of the SPO, the appropriate ALC, and the Using Command. The purpose of the RILSA is to ensure that all logistics elements are considered during the acquisition. Such considerations within the acquisitions process include ILS management functions, LSAR review, and initial provisioning. The only RILSA currently in operation is the C-17 RILSA at Douglas Airplane Company at Long Beach, CA which was established at the start of Full Scale Development to accomplish designated ILS and provisioning functions. The use of a RILSA is expected to reduce costs, shorten the provisioning process, and encourage more informed and timely support decisions.

## C.2.2.2 Air Force Contract Management Division.

The AFCMD is a division of AFSC which develops, maintains, and uses procedures to assess the Contractor's management system for performing LSA, and ensures that proper division personnel are trained on LSA policies and procedures. AFCMD also provides feedback as requested by HQ AFSC and the program offices concerning compatibility of LSA policies and guidance with existing contractual provisions for LSA.

## C.2.3 Supporting Command

The Supporting Command (usually AFLC) is the command assigned responsibility for supporting the Implementing Command in the acquisition process. The Supporting Command assumes responsibility for management of the weapon system from the Implementing Command at Program Management Responsibility Transfer (PMRT). Supporting Command responsibilities are as follows:

- Designate a Command OPR for ILS policy and implementation;
- Develop directives and guidance for LSA programs and implement ILS policies and procedures jointly with the Implementing Command;
- Designate a Deputy Program Manager for Logistics (DPML) or Integrated Logistics Support Manager (ILSM) to manage the ILS program as delineated by the PM.
- Assign responsibility for LSA program implementation to the System Program Manager;
- Review requests for LSA program waivers and coordinate these requests with the Implementing Command;
- Coordinate budgeting and funding requirements for LSA programs with the Implementing Command;
- Develop training policy in conjunction with AFSC and ATC for training staff and program management personnel;
- Provide LSA training;
- Identify, document, and maintain Lessons Learned on LSA implementation;
- Ensure that command policies and procedures relating to acquisition programs are compatible with the LSA process;
- Maintain the Air Force technical center for LSA;
- Represent Air Force at Joint Services LSA In-Process Reviews; and
- Serve as a member of the LSA Technical Steering Group.

The principal Supporting Command organizations involved in an acquisition are the ALCs, the AFALC and the AGMC. The AFLC is assisted by the ATC, and the Electronic Security Command (ESC). These organizations are depicted in Figure C-6.
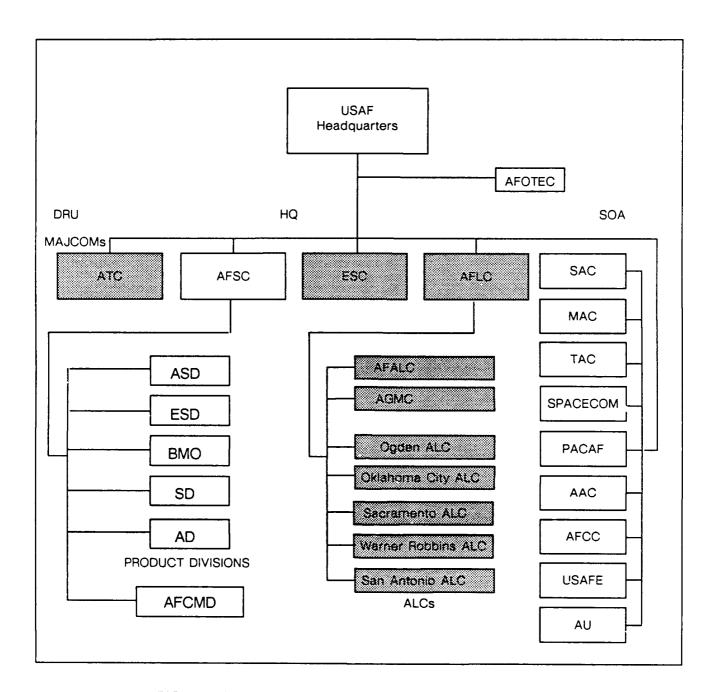
FIGURE C-6. SUPPORT COMMAND ORGANIZATIONS

## C.2.3.1 Air Logistics Centers

ALCs are the primary installations within AFLC and provide logistics support and management for a variety of weapons systems. There are five ALCs, each of which serves as the source of supply and repair for a unique set of aircraft, missiles, and engines. Each ALC also serves as the Technology Repair Center for a unique set of instruments, controls, and other weapons systems accessories.

The ALCs and the Aerospace Guidance and Metrology Center (AGMC) establish and maintain an OPR for LSA that is responsible for ensuring the distribution and implementation of LSA policies. The OPR provides guidance to the System Program Managers (SPMs), PMs, and IMs through local points of contact. The ALCs and the AGMC provide input to the SPO regarding the application of LSA to all programs for which AFLC is the Supporting Command and apply LSA policies and procedures to all acquisitions for which AFLC is the Implementing Command. They also support the SPO by reviewing and commenting on LSAR deliverables, by ensuring the maximum use of the LSAR as the source of data deliveries, and by using the LSAR to track the status of assigned programs with respect to established R&M goals

The typical ALC consists of seven directorates (see Figure C-7). The shaded directorates play a major role in acquisition and/or operational logistics. These directorates are:

*Maintenance (MA):* MA provides depot industrial capability to support maintenance requirements. MA also provides depot maintenance, modification, and repair of complete aircraft and missiles; and exchangeable components (smaller items that are repaired and recycled for installation in the field) for these systems. MA reviews LSA task analysis results and support item recommendations from a depot perspective.

*Distribution (DS):* DS receives, stores, issues, packages, and transports materiel worldwide using mechanized handling systems. DS reviews and approves Packaging, Handling, Storage, and Transportation (PHS&T) requirements for each configuration item by monitoring LSA/LSAR data.

*Contracting and Manufacturing (PM):* PM contracts with industry for the modification and maintenance of systems. PM provides policy guidance to and staff supervision over procurement and contract management activities and is responsible for the evaluation of contractor performance. PM is responsible for the timely delivery of quality goods and services. PM provides assistance in developing LSA/LSAR Statements of Work and assures that supportability constraints are reflected in contracts.

*Communication and Computer Systems (SC):* SC develops, acquires, and manages information systems supporting ALC functions. SC implements plans and policy covering the AFLC Logistics Force Structure Management Systems program and related computerized management information systems. SC oversees LSAR operations after Program Management Responsibility Transfer (PMRT) and provides database support during system modification.

*Material Management (MM):* MM performs program management functions. MM is responsible for keeping aircraft, missiles, and support systems at their highest operational readiness rate. As part of this responsibility MM buys, stores, issues and distributes Air Force supply items primarily related to weap-

ons systems. MM supports the Implementing Command by evaluating depot-level system requirements during the acquisition process. MM has the most extensive involvement with LSA/LSAR at the ALC and an extended description of that involvement is presented in the following section.
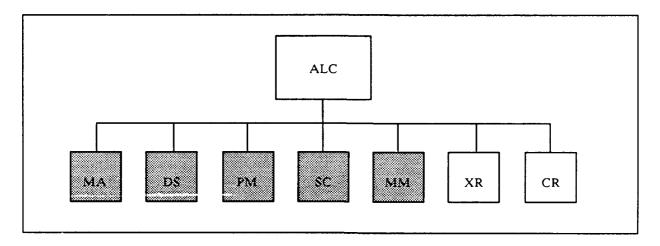


FIGURE C-7. ALC DIRECTORATES

*MM ORGANIZATIONAL ROLES AND RESPONSIBILITIES*

This section describes the LSA roles and responsibilities for each MM Division and Branch. Figure C-8 illustrates the placement of the various MM divisions and branches within the MM and ALC hierarchy.

*MMA Acquisition Division.* MMA ensures that the contract requirements of LSA task(s) in the statement of work, program management plan, and integrated logistics support plans are met. The division also ensures an effective and maximum use of LSAR data generated by the LSA process, (primarily contained in the LSAR.)

*MMA_ System Management Branch.* MMA_ supports the DPML/ILSM in the development, implementation, and management of an effective LSA program. This includes providing historical logistics data and operational data and assisting as necessary to achieve an effective LSA program.

*MMAR Engineering and Reliability Branch.* MMAR ensures that LSA tasks are conducted in conjunction with the systems engineering process. The branch participates in LSA/LSAR reviews and audits at the contractor facilities

*MMEA Material Analysis Branch.* MMEA serves as the point of contact in Logistics Support Analysis. The branch supports the DPML/ILSM in the development, implementation, and management of an effective LSA program, by providing historical logistics data and operational data and assisting as necessary to achieve an effective LSA program.

FIGURE C-8. ALC ORGANIZATIONS WITH A ROLE IN LSA

*MMIF Stock Fund Branch.* MMIF supports the DPML/ILSM in the development, implementation, and management of an effective LSA program. This includes providing historical logistics data and operational data, and assisting as necessary to achieve an effective LSA program.

*MMIM Logistics Management Branch.* MMIM ensures that the contract requirements of LSA task(s) in the statement of work, program management plan, and integrated logistics support plans are met. The branch also ensures effective and maximum use of LSAR data generated by the LSA process.

*MMIR Engineering and Reliability Branch.* MMIR assists program managers in the development and management of Logistics Support Analysis (MIL-STD-1388) programs. Branch activities include translating the maintenance concept into detailed maintenance plans (such as LSA reviews or repair level analysis). MMIR also ensures that LSA task(s) are conducted in conjunction with the systems engineering process. The branch also participates in LSA/LSAR reviews and audits at contractor facilities.

*MMS System Management Division.* MMS supports the DPML/ILSM in the development, implementation and management of an effective LSA program. This

includes providing historical logistics data and operational data and assisting as necessary to achieve an effective LSA program.
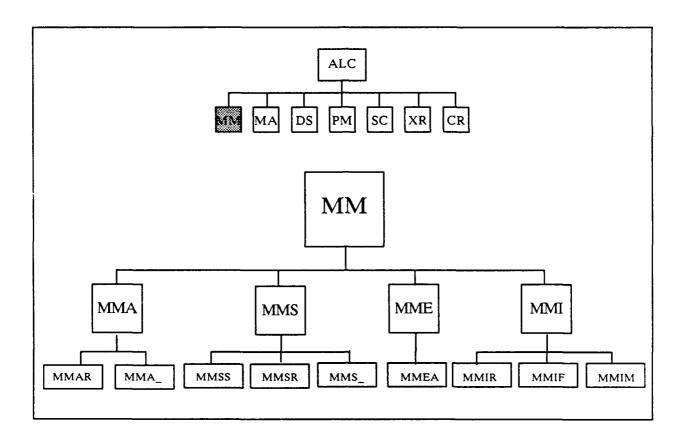
*MMS_ System Management Branch.* MMS_ ensures that the contract requirements of LSA task(s) in the statement of work, program management plan, and integrated logistics support plans are met. This ensures effective and maximum use of LSAR data generated by the LSA process.

*MMSR Engineering and Reliability.* MMSR ensures LSA task(s) are conducted in conjunction with the systems engineering process and participates in LSA/ LSAR reviews and audits at the contractor facilities.

*MMSS Materiel Support Branch.* MMSS participates in guidance, source coding, Source, Maintenance, and Recoverability (SMR) coding, LSA, Support Equipment (SE) and provisioning conferences.

## C.2.3.2 Air Force Acquisition Logistics Center (AFALC).

The mission of AFALC is to increase readiness and sustainability and to decrease the life cycle cost of weapon systems by injecting logistics concerns early in the weapon system design. AFALC carries out the logistics responsibilities of AFLC throughout the acquisition process for systems, subsystems, components, and support equipment to ensure that fielded systems are supportable and supported. AFALC is located at Wright–Patterson AFB, but has personnel assigned to AFSC product divisions and subordinate organizations throughout the country. These personnel assist in establishing logistics emphasis on new programs. All DPMLs are assigned to an acquisition program from AFALC. AFALC serves an interface role between AFLC and AFSC.

Eight of the nine deputates in AFALC and the Office of the Commander have a direct role in LSA. These organizations are shown in Figure C-9.

*AFALC ORGANIZATIONAL ROLES AND RESPONSIBILITIES*

*Specialized Management Office (CCJ).* CCJ provides acquisition logistics support for sensitive, highly compartmentalized, high priority, specialized management programs directed by HQ USAF.

*Deputy for Engineering and Reliability (ER).* ER manages engineering and technical logistics support for emerging technologies and all phases of acquisition programs. ER also ensures coordination with the SPOs to provide analysis and integrated logistics support for LSA.

*Logistics Support Analysis Program Application Division (ERLA).* ERLA serves as OPR for LSA; and develops and implements LSA tools and analytical techniques. Specific responsibilities of the Division are as follows:

- Review and provide LSA planning and management inputs to acquisition program documentation;

C-15

• Provide Lessons Learned (LL) concerning LSA application;



FIGURE C-9. AFALC ORGANIZATIONS INVOLVED WITH LSA

• Provide technical assistance and analysis to program/project offices in establishing and tailoring LSA to acquisition and research and development programs;

• Help develop contract provisions; and

• Participate in source selection activities;

• Provide technical assistance to program/project offices in conducting guidance conferences, technical reviews, and audits of contractor's analysis efforts; and

• Review, analyse and evaluate proposed automatic data processing models or other techniques used for LSA and contractor's proposed data collection and documentation systems.

*Logistics Support Analysis Program Procedures Division (ERLP)*. ERLP develops strategies, procedures, and management techniques to improve the application of LSA on research and development projects and systems/equipment acquisition programs. and sets up and maintains an LSA experience data base. The

Division recommends, prepares and issues guidance and procedures to implement LSA policy for program support. To accomplish this, the Division:

- Conducts surveys to determine LSA training requirements;
- Develops and implements an Air Force-wide LSA training program;
- Serves as the representative to joint service working groups for development and maintenance of the DoD LSA program, software and documentation;
- Serves as the representative to DoD and intracommand work groups, panels, study teams, and other staff groups responsible for LSA standardization efforts;
- Develops and maintains the standard data element dictionary and record layout and element requirements for the LSAR;
- Helps to develop the interface between LSAR and AFLC internal data management systems; and
- Provides Lessons Learned for LSA procedures.

*Reliability and Maintainability (R&M) Division (ERRR).* ERRR provides R&M engineering and technical assistance to acquisition logistics organizations, including those of AFSC program offices and laboratories. ERRR also develops acquisition logistics training material and provides training to new acquisition logistics personnel.

*Test and Evaluation (T&E) Division (ERRT).* ERRT provides technical ILS-T&E support to acquisition program offices, DPMLs and test directors. ERRT also provides DPMLs and core program staff with technical reports and briefings on problems affecting reliability and supportability.

*Deputy for Integrated Logistics (LS).* LS manages the development and distribution of acquisition logistics, ILS procedures and implementation guidance.

*Directorate of Support Equipment and Data (LSE).* LSE develops strategies and tactics for acquisition, and provides assistance and guidance to logistics managers.

*Directorate of Supply Support and Maintenance (LSG).* LSG serves as the OPR for supply support, maintenance planning, packaging, handling, transportation, and contractor support (including interim contractor support and contractor logistics support). LSG develops and provides guidance and direction to AFALC detachments and DPMLs/ILSMs, and develops instructional materials and presents training to DPMLs/ILSMs.

*Directorate of Studies and Analysis (LSS).* LSS serves as the OPR for Life Cycle Cost (LCC), Design to Cost (DTC), Repair Level Analysis (RLA), Manpower Requirements and Personnel (MRP), Training and Training Support (TTS), and

Logistics Support Resource Funds (LSRF). LSS identifies, monitors, and analyzes LSRF elements across a sample of programs, as necessary, to help DPMLs in estimating requirements, and provides assistance training, and Lessons Learned to acquisition logistics managers.

*Deputy for Operations (OP).* OP acts on behalf of the Commander for all operational plans, policies, techniques, procedures, and directives necessary to perform "post–milestone one" AFALC mission. OP functional responsibilities include participating in the coordination of all RFP, LCC, LSAR, ILSP and any other product that may affect assigned programs and projects; and evaluating the need for designating and terminating DPMLs and ILSMs for all acquisition programs.

*Directorate of Program Integration and Information (OPI).* OPI serves as OPR for assigned programs and projects. OPI evaluates overall DPML/ILS office program efforts and recommends actions to increase logistics effectiveness.

*Directorate of Management and Support (OPM).* OPM assists in recruiting, and/ or tracking acquisition logisticians, develops methods of recruiting and tracking potential acquisition logisticians, and prepares background information on potential candidates. OPM participates in the review, selection, and termination of DPMLs/ILSMs.

*Deputies for Acquisition Logistics (OA, OB, OE, OM, and OS).* The Deputies for Acquisition Logistics ensure that effective ILS programs are established and implemented for assigned weapon systems, equipment, and programs during all acquisition phases. These organizations also exercise control over program status and PMRT date, and insure applicable program(s) transfer from AFSC to AFLC. The LSA functional responsibilities are to:

- Provide logistics expertise and resources to support the product division;
- Serve as the primary AFLC spokesperson until PMRT;
- Initiate, review, conduct or ensure the accomplishment of LSA;
- Ensure logistics considerations are input to program contractual documents and source selection evaluation plan; and
- Participates in modification planning activities.

### C.2.3.3 Aerospace Guidance and Metrology Center (AGMC).

The AGMC is the single center in the Air Force for repairing inertial guidance and navigation systems for missiles and aircraft and aircraft displacement gyroscopes. AGMC provides a full range of consultation services on inertial guidance systems to the Air Force and other DoD agencies, and to the LSAR Review. AGMC also operates the Air Force Measurements Standards Laboratories and supports Precision Measurement Equipment Laboratories worldwide.

### C.2.3.4 Air Training Command (ATC)

ATC implements LSA policies and procedures issued by HQ USAF; participates in the LSA planning led by the Implementing Command, and provides coordinated training and training support. ATC also develops training and training support cost information for tradeoff studies and other purposes, as necessary. Command responsibilities are as follows:

- Designate an LSA point of contact for LSA policy, implementation, and technical training;

- Provide inputs to the LSA process on all acquisitions and modification programs requiring training;

- Utilize LSA outputs as the basis for system training development;

- Provide technical training specialists to participate in program, design, and logistic reviews of LSA documentation;

- Develop training and training support cost information for tradeoff studies, analyses, and other purposes as required;

- Develop and conduct LSA training programs as requested; and

- Review ATC training courses and incorporate a consideration of LSA where appropriate.

### C.2.3.5 Electronic Security Command (ESC)

ESC provides electronic combat support operations security, computer systems and communications security and communications support to Air Force units. The Command also supports weapon systems acquisitions when their specialized capabilities are required.

### C.2.4 The Using Command

The Using Command specifies the mission and requirements for the weapon system and uses the weapon system after it is fielded. Using Command responsibilities relating to LSA are as follows:

- Implement Air Force LSA policies and procedures jointly with Implementing and Supporting Commands;

- Participate with the Implementing and Supporting Command and test agencies in developing and implementing the LSA program;

- Develop the Statement of Need (SON) and provides operation and maintenance concepts;

- Perform operational test and evaluation;

- Provide operation and maintenance specialists to participate in program, design, and logistic reviews of LSA documentation;

- Assist DPML/ILSM in evaluating contractor LSA effort; and

- Provide representatives to LSA steering groups.

### C.2.4.1 Military Airlift Command (MAC)

MAC has committed resources to LSA through its Logistics Analysis Division (LGXP) and the C-17 Program Division (XPQC):

*Logistics Analysis Division (LGXP).* LGXP develops logistics processing and information systems and provides overall logistics control of automated system acquisition. The Division acts as the single logistics point of contact for automation requirements and for committees and working groups for automation programs outside DCS/Logistics. The Division is responsible for base level processing of aircraft recorded data in support of maintenance. LGXP serves as the major analysis function for DCS/Logistics and outside agencies, and initiates referral reports to other DCS/Logistics staff for investigation of problem areas identified from analyses. LGXP acts as the single DCS/Logistics validator of data provided to outside agencies and provides the DCS/Logistics central point of contact for SORTS; UNITREP; MAIRS; AVISURS; CAMMIS.

*C-17 Program Division (XPQC).* XPQC manages the acquisition and fielding of the C-17, including support equipment and training systems. System acquisition management includes providing Using Command support to the LSA process. The Division ensures military construction, logistics support, manpower, personnel, and basing requirements are identified and met, and ensures operational command requirements are met during all phases of development, (and) testing, and deployment. XPQC manages acquisition budget and program decision packages through the planning, programming and budgeting cycle.

### C.2.5 Air Force Operational Test and Evaluation Center (AFOTEC).

AFOTEC is an independent Air Force test agency responsible for testing new or modified Air Force systems under operationally realistic conditions. The primary purpose of AFOTEC's operational test and evaluation is to reduce operational risk in the acquisition process by determining how well systems perform when operated and maintained by Air Force personnel in an operationally realistic environment. AFOTEC provides assessments of the operational effectiveness and suitability of the Air Force's future weapon systems and supporting equipment. AFOTEC's operational tests ensure that new equipment meets the user's requirements and that the Air Forces weapon systems can be operated effectively and supported under realistic conditions. The results of AFOTEC's operational tests give "actual" figures in contrast to the predicted values produced from LSA.

Supporting Command responsibilities relating to LSA are as follows:

- Uses LSA documentation, including the LSAR, to perform the required trade-offs and analyses to support test objectives; and

- Ensures that appropriate test results are included in the LSA documentation.

### C.2.6 Major Participants

A number of government personnel play key roles in the planning, management, performance, review and validation of LSA. The role of the PM, Deputy Program Manager for Logistics (DPML), Integrated Logistics Support Manager (ILSM), and SPM follow.

*PROGRAM MANAGER (PM)*

The PM is the Air Force individual who has the authority and responsibility for managing an acquisition program. The PM is appointed by the Implementing Command and manages the SPO.

The PM establishes and maintains channels of communication between all participating agencies. The PM ensures that LSA as an integral part of the systems engineering process in each phase of the acquisition program. The PM uses LSA:

- To integrate supportability into the weapon system design;

- To document logistics requirements through the system engineering process;

- To quantitatively relate the readiness of the system to the intended system design and its projected resource requirements; and

- To reduce operating and support costs during the system design process.

After program initiation, each PM develops an "acquisition strategy" to apply during the program's entire acquisition process. The strategy must form the basis for the PM's program management plan (PMP), and provide an economical, effective, and efficient approach to achieving program objectives.

The LSA responsibilities of the PM are as follows:

- Establish, implement, and manage an ILS program until PMRT;

- Plan for PMRT according to AFR 800-4 or as HQ USAF directs;

- Report the status of ILS elements at each program review;

- Identify specific ILS piogram management functions that will be managed by the DPML, ILSM, and delegate sufficient authority to the DPML or ILSM to carry out ILS program tasks;

- Ensure timely definition and application of LSA tasks;

- Assure that contract data requirements are tailored to conform with specific program needs and prevent duplication of LSA tasks in the SOW;

- Assure that LSA is an integral part of the PMP, ILSP, SEMP, and TEMP;

- Eliminate duplication of developed data through maximum use of the LSAR and automated application programs;

- Maintain close coordination with the Supporting and Using Commands to ensure that support requirements are considered in the acquisition process;

- Ensure the contractor's engineering plan contains effective integration of LSA and engineering disciplines; and

- Ensure attendance of all functional area representatives at LSA reviews.

*DEPUTY PROGRAM MANAGER FOR LOGISTICS (DPML) AND THE INTEGRATED LOGISTICS SUPPORT MANAGER (ILSM)*

The PM is supported by the DPML for major programs, or the Integrated Logistics Support Manager (ILSP) for non-major programs. Both managers are experienced logisticians. They are assigned by either AFALC to the SPO (DPML), or by the AFSC (ILSM), during concept exploration, demonstration/validation, or full scale development to assist in executing ILS responsibilities throughout the acquisition program.

The relationship of the DPML and ILSM to both the Supporting Command and the Implementing Command is illustrated in Figure C-10.
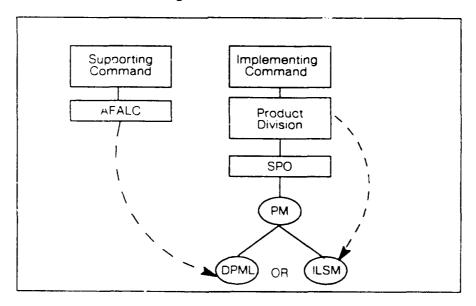


FIGURE C-10. DPML AND ILSM APPOINTMENT

ILS, which includes LSA, is a program management responsibility assigned in whole or in part by the PM to the DPML or ILSM. The LSA responsibilities of the DPML/ILSM are as follows:

- Manage the components of the ILS program assigned by the PM;

- Tailor LSA to the specific needs of the program;

- Maintain close coordination with all program offices to ensure that support requirements are considered in the acquisition process;

- Coordinate with the System Manager, the Item Managers, the Technology Repair Center, and Contractor personnel;

- Ensure that LSA requirements are represented in contracts;

- Evaluate the Contractor's engineering plan to ensure that the plan contains effective integration of LSA and engineering disciplines;

- Coordinate the evaluation of the Contractor's effort with AFLC and the Using Command; and

- Conduct LSAR reviews and ensure the validity of LSA documentation.

*SYSTEM PROGRAM MANAGER (SPM)*

The SPM is appointed by AFLC early in the acquisition and is responsible for coordinating the functions necessary to provide effective system support. The SPM ensures LSA is applied to all acquisitions and modifications and that it is an integral part of the systems engineering process. The SPM provides advice and assistance to the PM on the development, implementation, and management of the LSA program; and ensures that LSA is applied to all AFLC-managed assigned acquisition and modification programs. The SPM reviews LSA data deliverables and ensures that representatives from all Supporting Command LSA functional areas attend LSA reviews.

## C.3 ORGANIZATIONAL MATRICES

This section presents a series of matrices which are the result of a detailed analysis of AFR 800-34. Each matrix depicts the organizational environment of LSA by mapping the principal organizations responsible for performing, supporting, reviewing, and/or approving LSA tasks to the LSA tasks themselves. Each matrix cell shows the particular function performed by each agency on each LSA task. These functions are listed in the legend presented in Figure C-11, which is also presented at the end of each matrix.

```
LEGEND
x   Perform Task
*   Perform for Design Changes Only
i   Input Task
s   Support Task and/or Review
c   Conduct Review
a   Approve Output
r   Review Output
```

FIGURE C-11. MATRIX LEGEND

**Perform task** means to carry out all phases of the technical work necessary to complete the task and to document the results of the task in the LSAR or other appropriate document.

**Perform for Design Changes Only** means to perform tasks for design change efforts only.

**Input task** means to provide input necessary to perform the task

**Support task and/or review** means to participate in the review of task products.

**Conduct Review** means to schedule the review, to ensure that the appropriate personnel are notified and invited, that appropriate materials for review are distributed, and that appropriate review procedures are established and followed.

**Approve Output** a task means to certify the output of an LSA task as acceptable for the Air Force.

**Review Output** means to inspect the documentation of the technical effort for the purpose of ensuring accuracy, thoroughness, and completeness, and for determining the impact of the results of the task on weapon system design and supportability.

Since these functions can vary according to the phase of the acquisition cycle, five matrices are presented: Preconcept, Concept Exploration, Demonstration/Validation, Full Scale Development, and Production/Deployment. The matrices are accompanied by a narrative description of the principal LSA activities associated with each phase of the acquisition and any significant organizational interactions associated with those tasks.

## C.3.1 Preconcept

Organizational roles and responsibilities during the Preconcept Phase are presented in Figure C-12. During the Preconcept phase, initial mission and support systems definition are implemented at the system and subsystem level.

*LSA TASKS*

At the Preconcept phase, LSA is limited to a Use Study and a Comparative Analysis performed by Contractor personnel supported by Air Force engineers and management. The Use Study is supported by representatives of AFSC, the ALC, and the Using Command.

| | HQ AFSC | USING CMD | AFLC ALCs | AFOTEC | ATC | AIR FORCE ENGINEERS/ LABS | CONTR |
|---|---|---|---|---|---|---|---|
| **100 - PROGRAM PLANNING & CONTROL** | | | | | | | |
| 101 - Development of Early Logistics Support Strategy | | | | | | | |
| 101.1 - LSA Strategy | | | | | | | |
| 101.2 - Updates | | | | | | | |
| 102 - Logistics Support Analysis Plan | | | | | | | |
| 102.1 - LSA Plan | | | | | | | |
| 102.2 - Updates | | | | | | | |
| 103 - Program and Design Reviews | | | | | | | |
| 103.1 - Establish Review Procedures | | | | | | | |
| 103.2 - Design Reviews | | | | | | | |
| 103.3 - Program Reviews | | | | | | | |
| 103.4 - LSA Review | | | | | | | |
| **200 - MISSION & SUPPORT SYSTEMS DEFINITION** | | | | | | | |
| 201 - Use Study | | | | | | | |
| 201.1 - Supportability Factors | s | s | s | | | a/i | x |
| 201.2 - Quantitative Factors | | | | | | i | x |
| 201.3 - Field Visits | | | | | | i | x |
| 201.4 - Use Study Report and Updates | | | | | | a/r | x |
| 202 - Mission Hardware, Software, and Support System Standardization | | | | | | | |
| 202.1 - Supportability Constraints | | | | | | | |
| 202.2 - Supportability Characteristics | | | | | | | |
| 202.3 - Recommended Approaches | | | | | | | |
| 202.4 - Risks | | | | | | | |
| 203 - Comparative Analysis | | | | | | | x |
| 203.1 - Identify Comparative Systems | | | | | | s | x |
| 203.2 - Baseline Comparative System | | | | | | r | x |
| 203.3 - Comparative System Characteristics | | | | | | i | x |
| 203.4 - Qualitative Supportability Problems | | | | | | i | x |
| 203.5 - Supportability Cost and Readiness Driver | | | | | | a/r | x |
| 203.6 - Unique System Drivers | | | | | | a/r | x |
| 203.7 - Updates | | | | | | | |
| 203.8 - Risks and Assumptions | | | | | | a/r | x |
| 204 - Technological Opportunities | | | | | | | |
| 204.1 - Recommended Design Objectives | | | | | | | |
| 204.2 - Updates | | | | | | | |
| 204.3 - Risks | | | | | | | |
| 205 - Supportability & Supportability Related Design Factors | | | | | | | |
| 205.1 - Supportability Characteristics | | | | | | | |
| 205.2 - Supportability Objectives & Associated Risks | | | | | | | |
| 205.3 - Specification Requirements | | | | | | | |
| 205.4 - NATO Constraints | | | | | | | |
| 205.5 - Supportability Goals & Thresholds | | | | | | | |

FIGURE C-12. DETAILED LSA ORGANIZATIONAL ENVIRONMENT -- PRECONCEPT PHASE

| | HQ AFSC | USING CMD | AFLC ALCs | AFOTEC | ATC | AIR FORCE ENGINEERS/ LABS | CONTR |
|---|---|---|---|---|---|---|---|
| **300 – PREPARATION AND EVALUATION OF ALTERNATIVES** | | | | | | | |
| 301 – Functional Requirements Identification | | | | | | | |
| 301.1 – Functional Requirements | | | | | | | |
| 301.2 – Unique Functional Requirements | | | | | | | |
| 301 3 – Risks | | | | | | | |
| 301 4 – Operations and Maintenance Tasks | | | | | | | |
| 301.5 – Design Alternatives | | | | | | | |
| 301.6 – Updates | | | | | | | |
| **302 – Support System Alternatives** | | | | | | | |
| 302.1 – Alternative Support Concepts | | | | | | | |
| 302.2 – Support Concept Updates | | | | | | | |
| 302.3 – Alternative Support Plans | | | | | | | |
| 302.4 – Support Plan Updates | | | | | | | |
| 302.5 – Risks | | | | | | | |
| **303 – Evaluation of Alternatives and Tradeoff Analysis** | | | | | | | |
| 303.1 – Tradeoff Criteria | | | | | | | |
| 303 2 – Support Systems Tradeoffs | | | | | | | |
| 303.3 – System Tradeoffs | | | | | | | |
| 303.4 – Readiness Sensitivities | | | | | | | |
| 303.5 – Manpower and Personnel Tradeoffs | | | | | | | |
| 303.6 – Training Tradeoffs | | | | | | | |
| 303.7 – Repair Level Analyses | | | | | | | |
| 303.8 – Diagnostic Tradeoffs | | | | | | | |
| 303.9 – Comparative Evaluations | | | | | | | |
| 303.10 – Energy Tradeoffs | | | | | | | |
| 303.11 – Survivability Tradeoffs | | | | | | | |
| 303.12 – Transportability Tradeoffs | | | | | | | |
| **400 – DETERMINATION OF LOGISTIC SUPPORT RESOURCE REQUIREMENTS** | | | | | | | |
| 401 – Task Analysis | | | | | | | |
| 401 1 – Task Analysis | | | | | | | |
| 401 2 – Analysis Documentation | | | | | | | |
| 401.3 – New/Critical Support Resources | | | | | | | |
| 401.4 – Training Requirements & Recommendations | | | | | | | |
| 401.5 – Design Improvements | | | | | | | |
| 401.6 – Manangement Plans | | | | | | | |
| 401.7 – Transportability Analysis | | | | | | | |
| 401.8 – Provisioning Requirements | | | | | | | |
| 401.9 – Validation | | | | | | | |
| 401.10 – ILS Output Products | | | | | | | |
| 401.11 – LSAR Updates | | | | | | | |
| **402 – Early Fielding Analysis** | | | | | | | |
| 402 1 – New System Impact | | | | | | | |
| 402.2 – Sources of Manpower & Personnel Skills | | | | | | | |
| 402 3 – Impact on Resource Shortfalls | | | | | | | |
| 402 4 – Combat Resource Requirements | | | | | | | |
| 402.5 – Plans for Problem Resolution | | | | | | | |
| **403 – Post Production Support Analysis** | | | | | | | |
| 403 1 – Post Production Support Plan | | | | | | | |

FIGURE C-12. DETAILED LSA ORGANIZATIONAL ENVIRONMENT -- PRECONCEPT PHASE

| | HQ AFSC | USER CMD | AFLC ALCs | AFOTEC | ATC | AIR FORCE ENGINEERS/ LAB | CONTR |
|---|---|---|---|---|---|---|---|
| 500 – SUPPORTABILITY ASSESSMENT | | | | | | | |
| 501 – Supportability, Test, Evaluation, and Verification | | | | | | | |
| 501.1 – Test and Evaluation Strategy | | | | | | | |
| 501.2 – Objectives and Criteria | | | | | | | |
| 501.3 – Updates and Criteria | | | | | | | |
| 501.4 – Supportability Assessment Plan (Post Deployment) | | | | | | | |
| 501.5 – Supportability Assessment (Post Deployment) | | | | | | | |

```
LEGEND

x  Perform Task
*  Perform for Design Changes only
I  Input Task
s  Support Task and/or Review
c  Conduct Review
a  Approve Output
r  Review Output
```

FIGURE C-12. DETAILED LSA ORGANIZATIONAL ENVIRONMENT -- PRECONCEPT PHASE

## C.3.2  Concept Exploration

Organizational roles and responsibilities during Concept Exploration (CE) are presented in Figure C-13. CE results in a series of conceptual studies and in the investigation of alternative solutions at both the system and subsystem levels. During CE, LSA is used to determine a preferred or proposed design that balances performance and supportability at an acceptable life cycle cost. LSA is also used at this phase of the acquisition to determine the most effective and efficient support system for the weapon system under analysis. System operational requirements are inputs to this analysis. Qualitative supportability constraints are documented in the system specifications, other requirements documents, or contracts as appropriate.

Program Planning and Control tasks are initiated during CE. The Implementing Command can accomplish the Development of an Early Logistics Support Strategy as soon as the program begins, and this task should be accomplished prior to releasing the RFP. The Early Logistics Support Strategy is developed by the DPML with support from the PM.

The Contractor develops the Logistics Support Analysis Plan (LSAP), which is reviewed by the DPML and approved by the PM. Organizational structure is one of the many items that can be included in this plan at this phase of the acquisition. In follow-on phases, the LSAP is updated to reflect additional information. The LSAP can serve as documentation if assessment of the Contractor's performance is required.

| | HQ AFSC | USING CMD | AFLC ALCs | AFOTEC | ATC | PM | SPO DPML | CONTR |
|---|---|---|---|---|---|---|---|---|
| **100 – PROGRAM PLANNING & CONTROL** | | | | | | | | |
| 101 – Development of Early Logistics Support Strategy | | | | | | | | |
| 101.1 – LSA Strategy | | | | | | s | x | |
| 101.2 – Updates | | | | | | s | x | |
| 102 – Logistics Support Analysis Plan | | | | | | | | |
| 102.1 – LSA Plan | | | | | | a | r | x |
| 102.2 – Updates | | | | | | a | r | x |
| 103 – Program and Design Reviews | | | | | | | | |
| 103.1 – Establish Review Procedures | | | | | | x | s | s |
| 103.2 – Design Reviews | | | | | | c | s | s |
| 103.3 – Program Reviews | | | | | | c | s | s |
| 103.4 – LSA Review | s | s | s | s | s | s | c | s |
| **200 – MISSION & SUPPORT SYSTEMS DEFINITION** | | | | | | | | |
| 201 – Use Study | | | | | | | | |
| 201.1 – Supportability Factors | | | | | | i | i | x |
| 201.2 – Quantitative Factors | | | | | | | i | x |
| 201.3 – Field Visits | s | s | s | | | | s | x |
| 201.4 – Use Study Report and Updates | | | | | | a | r | x |
| 202 – Mission Hardware, Software, and Support System Standardization | | | | | | | | |
| 202.1 – Supportability Constraints | | | | | | | s | x |
| 202.2 – Supportability Characteristics | | | | | | | s | x |
| 202.3 – Recommended Approaches | | | | | | | s | x |
| 202.4 – Risks | | | | | | | s | x |
| 203 – Comparative Analysis | | | | | | | | |
| 203.1 – Identify Comparative Systems | | | | | | a | r | x |
| 203.2 – Baseline Comparative System | | | | | | a | r | x |
| 203.3 – Comparative System Characteristics | | | | | | a | r | x |
| 203.4 – Qualitative Supportability Problems | | | | | | a | r | x |
| 203.5 – Supportability Cost and Readiness Driver | | | | | | a | r | x |
| 203.6 – Unique System Drivers | | | | | | a | r | x |
| 203.7 – Updates | | | | | | a | r | x |
| 203.8 – Risks and Assumptions | | | | | | a | r | x |
| 204 – Technological Opportunities | | | | | | | | |
| 204.1 – Recommended Design Objectives | | | | | | a | r | x |
| 204.2 – Updates | | | | | | a | r | x |
| 204.3 – Risks | | | | | | a | r | x |
| 205 – Supportability & Supportability Related Design Factors | | | | | | | | |
| 205.1 – Supportability Characteristics | | | | | | | i | x |
| 205.2 – Supportability Objectives & Associated Risks | | | | | | | | |
| 205.3 – Specification Requirements | | | | | | | s | x |
| 205.4 – NATO Constraints | | | | | | a | r | x |
| 205.5 – Supportability Goals & Thresholds | | | | | | | i | x |

FIGURE C-13. DETAILED LSA ORGANIZATIONAL ENVIRONMENT -- CONCEPT PHASE

| | HQ AFSC | USING CMD | AFLC ALCs | AFOTEC | ATC | PM | SPO DPML | CONTR |
|---|---|---|---|---|---|---|---|---|
| 300 – PREPARATION AND EVALUATION OF ALTERNATIVES | | | | | | | | |
| 301 – Functional Requirements Identification | | | | | | | | |
| 301.1 – Functional Requirements | s | s | s | | | a | i | x |
| 301.2 – Unique Functional Requirements | s | s | s | | | a | i | x |
| 301.3 – Risks | s | s | s | | | a | i | x |
| 301.4 – Operations and Maintenance Tasks | s | s | s | | | a | i | x |
| 301.5 – Design Alternatives | s | s | s | | | a | i | x |
| 301.6 – Updates | s | s | s | | | a | i | x |
| 302 – Support System Alternatives | | | | | | | | |
| 302.1 – Alternative Support Concepts | | | | | | a | s | x |
| 302.2 – Support Concept Updates | | | | | | a | s | x |
| 302.3 – Alternative Support Plans | | | | | | a | s | x |
| 302.4 – Support Plan Updates | | | | | | a | s | x |
| 302.5 – Risks | | | | | | a | s | x |
| 303 – Evaluation of Alternatives and Tradeoff Analysis | | | | | | | | |
| 303.1 – Tradeoff Criteria | | | | | | | i | x |
| 303.2 – Support Systems Tradeoffs | | | | | | | s | x |
| 303.3 – System Tradeoffs | | | | | | r | s | x |
| 303.4 – Readiness Sensitivities | | | | | | r | s | x |
| 303.5 – Manpower and Personnel Tradeoffs | | | | | | r | r | x |
| 303.6 – Training Tradeoffs | | | | | s | r | r | x |
| 303.7 – Repair Level Analyses | | | s | | | r | r | x |
| 303.8 – Diagnostic Tradeoffs | | | s | | | r | r | x |
| 303.9 – Comparative Evaluations | | | | | | r | s | x |
| 303.10 – Energy Tradeoffs | | | | | | r | s | x |
| 303.11 – Survivability Tradeoffs | | | | | | r | s | x |
| 303.12 – Transportability Tradeoffs | | | | | | r | s | x |
| 400 – DETERMINATION OF LOGISTIC SUPPORT RESOURCE REQUIREMENTS | | | | | | | | |
| 401 – Task Analysis | | | | | | | | |
| 401.1 – Task Analysis | | | | | | | | |
| 401.2 – Analysis Documentation | | | | | | | | |
| 401.3 – New/Critical Support Resources | | | | | | | | |
| 401.4 – Training Requirements & Recommendations | | | | | | | | |
| 401.5 – Design Improvements | | | | | | | | |
| 401.6 – Management Plans | | | | | | | | |
| 401.7 – Transportability Analysis | | | | | | | | |
| 401.8 – Provisioning Requirements | | | | | | | | |
| 401.9 – Validation | | | | | | | | |
| 401.10 – ILS Output Products | | | | | | | | |
| 401.11 – LSAR Updates | | | | | | | | |
| 402 – Early Fielding Analysis | | | | | | | | |
| 402.1 – New System Impact | | | | | | | | |
| 402.2 – Sources of Manpower & Personnel Skills | | | | | | | | |
| 402.3 – Impact on Resource Shortfalls | | | | | | | | |
| 402.4 – Combat Resource Requirements | | | | | | | | |
| 402.5 – Plans for Problem Resolution | | | | | | | | |
| 403 – Post Production Support Analysis | | | | | | | | |
| 403.1 – Post Production Support Plan | | | | | | | | |

FIGURE C-13. DETAILED LSA ORGANIZATIONAL ENVIRONMENT -- CONCEPT PHASE

| | HQ AFSC | USING CMD | AFLC ALCs | AFOTEC | ATC | PM | SPO DPML | CONTR |
|---|---|---|---|---|---|---|---|---|
| **500 - SUPPORTABILITY ASSESSMENT** | | | | | | | | |
| 501 - Supportability, Test, Evaluation, and Verification | | | | | | | | |
| 501.1 - Test and Evaluation Strategy | | | | | | | | |
| 501.2 - Objectives and Criteria | | | | s | | a | r | x |
| 501.3 - Updates and Criteria | | | | | | | | |
| 501.4 - Supportability Assessment Plan (Post Deployment) | | | | | | | | |
| 501.5 - Supportability Assessment (Post Deployment) | | | | | | | | |

```
LEGEND
x   Perform Task
*   Perform for Design Changes only
i   Input Task
s   Support Task and/or Review
c   Conduct Review
a   Approve Output
r   Review Output
```

FIGURE C-13.  DETAILED LSA ORGANIZATIONAL ENVIRONMENT -- CONCEPT PHASE

At CE, Contractors are provided LSA task tailoring information to ensure that the LSA procedures impact the design decision-making process and to ensure that supportability issues are given adequate consideration.  Contractors are also provided detailed descriptions of current and projected manpower, skill, and training resources and shortfalls.

Regular reviews of the contractor's analysis program are scheduled.  During CE, reviews are made of the design in terms of supportability.  The government must determine through regular contact with the contractor whether support factors, constraints, and resource requirements are being considered by both the logistics and design staffs in a cost and operationally effective manner.  In the Use Study the Contractor develops and analyses preliminary employment plans, basing, and deployment concepts.  These concepts will be used to identify support factors and constraints which must be considered during the design of the system.  The government may need to provide a substantial amount of information for the contractor to perform this task, and the PM, the ALC, the Using Command, and HQ AFSC all support this task.

During Concept Exploration, the Contractor also completes the Identification and Evaluation of Support System Alternatives.  The Contractor is supported in the identification of Support System Alternatives by the DPML.  In the Functional Requirements Identification and the Evaluation of Alternatives and Tradeoff Analysis, the Contractor is also

supported by the Using Command, the ALC, and the DPML. HQ/AFSC also supports the Functional Requirements Identification.

### C.3.3 Demonstration/Validation

Organizational roles and responsibilities during Demonstration/Validation (Dem/Val) are presented in Figure C-14. Dem/Val is the phase in the acquisition during which major system alternatives are identified and analysed, and competitive demonstrations of weapon systems, subsystems and subassemblies are conducted. Supportability requirements of the system are further defined and support system alternatives selected. Information developed during CE is updated as the design is further developed and better information becomes available.

*LSA TASKS*

During Dem/Val, LSA tasks are reviewed to ensure functional requirements have been identified and tradeoffs conducted to determine the best balance between hardware characteristics, support concept, and support resource requirements. The DPML and the PM review the task analysis and the PM approves it. An additional iteration of all those tasks performed during concept exploration is continued at the subsystem and subassembly level. During Dem/Val, the PM becomes more heavily involved in the Program and Design Reviews.

### C.3.4 Full Scale Development

Organizational roles and responsibilities during Full Scale Development (FSD) are presented in Figure C-15. The design and test of the selected system alternative is completed during FSD and design tradeoffs are incorporated into the weapon system. During FSD, the LSA process further refines data applicability to lower levels of hardware and identifies firm operation and maintenance tasks. A detailed task analysis is conducted on all maintenance significant items. The Contractor performs the eleven LSA tasks which can be applied during this phase.

*LSA TASKS*

During FSD, all LSA tasks begun in previous phases are continued on an iterative basis at the subsystem, subassembly, and component levels. An analysis of required operations and maintenance tasks is accomplished and LSAR data is generated by the Contractor and reviewed by the Government. Early Fielding Analysis is usually performed by the contractor with in-depth support from HQ/AFSC, the ALC, the Using Command, and ATC. The analysis is reviewed by the DPML and approved by the PM. During FSD, the following LSA Tasks are performed only on an as-needed basis:

| | HQ AFSC | USING CMD | AFLC ALCs | AFOTEC | ATC | PM | SPO DPML | CONTR |
|---|---|---|---|---|---|---|---|---|
| **100 – PROGRAM PLANNING & CONTROL** | | | | | | | | |
| 101 – Development of Early Logistics Support Strategy | | | | | | | | |
| 101.1 – LSA Strategy | | | | | | s | x | |
| 101.2 – Updates | | | | | | s | x | |
| 102 – Logistics Support Analysis Plan | | | | | | | | |
| 102.1 – LSA Plan | | | | | | a | r | x |
| 102.2 – Updates | | | | | | a | r | x |
| 103 – Program and Design Reviews | | | | | | | | |
| 103.1 – Establish Review Procedures | | | | | | x | s | s |
| 103.2 – Design Reviews | | | | | | c | s | s |
| 103.3 – Program Reviews | | | | | | c | s | s |
| 103.4 – LSA Review | s | s | s | s | s | s | c | s |
| **200 – MISSION & SUPPORT SYSTEMS DEFINITION** | | | | | | | | |
| 201 – Use Study | | | | | | | | |
| 201.1 – Supportability Factors | | | | | | | i | x |
| 201.2 – Quantitative Factors | | | | | | | i | x |
| 201.3 – Field Visits | s | s | s | | | | s | x |
| 201.4 – Use Study Report and Updates | | | | | | a | r | x |
| 202 – Mission Hardware, Software, and Support System Standardization | | | | | | | | |
| 202.1 – Supportability Constraints | | | | | | | s | x |
| 202.2 – Supportability Characteristics | | | | | | | s | x |
| 202.3 – Recommended Approaches | | | | | | | s | x |
| 202.4 – Risks | | | | | | | s | x |
| 203 – Comparative Analysis | | | | | | | | |
| 203.1 – Identify Comparative Systems | | | | | | a | r | x |
| 203.2 – Baseline Comparative System | | | | | | a | r | x |
| 203.3 – Comparative System Characteristics | | | | | | a | r | x |
| 203.4 – Qualitative Supportability Problems | | | | | | a | r | x |
| 203.5 – Supportability Cost and Readiness Driver | | | | | | a | r | x |
| 203.6 – Unique System Drivers | | | | | | a | r | x |
| 203.7 – Updates | | | | | | a | r | x |
| 203.8 – Risks and Assumptions | | | | | | a | r | x |
| 204 – Technological Opportunities | | | | | | | | |
| 204.1 – Recommended Design Objectives | | | | | | a | r | x |
| 204.2 – Updates | | | | | | a | r | x |
| 204.3 – Risks | | | | | | a | r | x |
| 205 – Supportability & Supportability Related Design Factors | | | | | | | | |
| 205.1 – Supportability Characteristics | | | | | | | i | x |
| 205.2 – Supportability Objectives & Associated Risks | | | | | | | s | x |
| 205.3 – Specification Requirements | | | | | | a | r | x |
| 205.4 – NATO Constraints | | | | | | | i | x |
| 205.5 – Supportability Goals & Thresholds | | | | | | a | r | x |

FIGURE C-14. DETAILED LSA ORGANIZATIONAL ENVIRONMENT -- DEM/VAL PHASE

| | HQ AFSC | USING CMD | AFLC ALCs | AFOTEC | ATC | PM | SPO DPML | CONTR |
|---|---|---|---|---|---|---|---|---|
| **300 - PREPARATION AND EVALUATION OF ALTERNATIVES** | | | | | | | | |
| 301 - Functional Requirements Identification | | | | | | | | |
| 301.1 - Functional Requirements | s | s | s | | | a | i | x |
| 301.2 - Unique Functional Requirements | s | s | s | | | a | i | x |
| 301.3 - Risks | s | s | s | | | a | i | x |
| 301.4 - Operations and Maintenance Tasks | s | s | s | | | a | i | x |
| 301.5 - Design Alternatives | s | s | s | | | a | i | x |
| 301.6 - Updates | s | s | s | | | a | l | x |
| **302 - Support System Alternatives** | | | | | | | | |
| 302.1 - Alternative Support Concepts | | | | | | a | s | x |
| 302.2 - Support Concept Updates | | | | | | a | s | x |
| 302.3 - Alternative Support Plans | | | | | | a | s | x |
| 302.4 - Support Plan Updates | | | | | | a | s | x |
| 302.5 - Risks | | | | | | a | s | x |
| **303 - Evaluation of Alternatives and Tradeoff Analysis** | | | | | | | | |
| 303.1 - Tradeoff Criteria | | | | | | | i | x |
| 303.2 - Support Systems Tradeoffs | | | | | | | s | x |
| 303.3 - System Tradeoffs | | | | | | r | s | x |
| 303.4 - Readiness Sensitivities | | | | | | r | s | x |
| 303.5 - Manpower and Personnel Tradeoffs | | | | | | r | r | x |
| 303.6 - Training Tradeoffs | | | | | s | r | r | x |
| 303.7 - Repair Level Analyses | | | s | | | r | r | x |
| 303.8 - Diagnostic Tradeoffs | | | s | | | r | r | x |
| 303.9 - Comparative Evaluations | | | | | | r | s | x |
| 303.10 - Energy Tradeoffs | | | | | | r | s | x |
| 303.11 - Survivability Tradeoffs | | | | | | r | s | x |
| 303.12 - Transportability Tradeoffs | | | | | | r | s | x |
| **400 - DETERMINATION OF LOGISTIC SUPPORT RESOURCE REQUIREMENTS** | | | | | | | | |
| 401 - Task Analysis | | | | | | | | |
| 401.1 - Task Analysis | | | | | | r | s | x |
| 401.2 - Analysis Documentation | | | | | | a | r | x |
| 401.3 - New/Critical Support Resources | | | | | | r | s | x |
| 401.4 - Training Requirements & Recommendations | | | | | s | r | s | x |
| 401.5 - Design Improvements | | | | | | a | r | x |
| 401.6 - Management Plans | | | | | | a | r | x |
| 401.7 - Transportability Analysis | | | | s | | r | s | x |
| 401.8 - Provisioning Requirements | | | | s | | r | s | x |
| 401.9 - Validation | s | s | s | s | s | a | r | x |
| 401.10 - ILS Output Products | | | | s | | a | r | x |
| 401.11 - LSAR Updates | | | | s | | a | r | x |
| **402 - Early Fielding Analysis** | | | | | | | | |
| 402.1 - New System Impact | | | | | | | | |
| 402.2 - Sources of Manpower & Personnel Skills | | | | | | | | |
| 402.3 - Impact on Resource Shortfalls | | | | | | | | |
| 402.4 - Combat Resource Requirements | | | | | | | | |
| 402.5 - Plans for Problem Resolution | | | | | | | | |
| **403 - Post Production Support Analysis** | | | | | | | | |
| 403.1 - Post Production Support Plan | | | | | | | | |

FIGURE C-14. DETAILED LSA ORGANIZATIONAL ENVIRONMENT -- DEM/VAL PHASE

| | HQ AFSC | USING CMD | AFLC ALCs | AFOTEC | ATC | PM | SPO DPML | CONTR |
|---|---|---|---|---|---|---|---|---|
| **500 - SUPPORTABILITY ASSESSMENT** | | | | | | | | |
| 501 - Supportabillty, Test, Evaluation, and Verification | | | | | | | | |
| 501.1 - Test and Evaluation Strategy | | | s | s | | a | r | x |
| 501.2 - Objectives and Criteria | | | | r | | a | r | x |
| 501.3 - Updates and Criteria | | | | r | | a | r | x |
| 501.4 - Supportability Assessment Plan (Post Deployment) | | | | r | | a | r | x |
| 501.5 - Supportability Assessment (Post Deployment) | | | | | | | | |

```
LEGEND

x   Perform Task
*   Perform for Design Changes only
i   Input Task
s   Support Task and/or Review
c   Conduct Review
a   Approve Output
r   Review Output
```

FIGURE C-14. DETAILED LSA ORGANIZATIONAL ENVIRONMENT -- DEM/VAL PHASE

204 Technological Opportunities

301 Functional requirements Identification.

302 Support System Alternatives.

303 Evaluation of Alternatives and Tradeoff Analysis

401 Task Analysis

501 Supportability, Test, Evaluation, and Verification.

## C.3.5 Production/Deployment

During Production/Deployment (PROD), the requirements identified in the previous acquisition phases are completed and plans implemented to field a supported weapon system. Organizational roles and responsibilities during Full Scale Development (FSD) are presented in Figure C-16.

| | HQ AFSC | USING CMD | AFLC ALCs | AFOTEC | ATC | PM | SPO DPML | CONTR |
|---|---|---|---|---|---|---|---|---|
| 100 - PROGRAM PLANNING & CONTROL | | | | | | | | |
| 101 - Development of Early Logistics Support Strategy | | | | | | | | |
| 101.1 - LSA Strategy | | | | | | s | X | |
| 101.2 - Updates | | | | | | s | X | |
| 102 - Logistics Support Analysis Plan | | | | | | | | |
| 102.1 - LSA Plan | | | | | | a | r | x |
| 102.2 - Updates | | | | | | a | r | x |
| 103 - Program and Design Reviews | | | | | | | | |
| 103.1 - Establish Review Procedures | | | | | | x | s | s |
| 103.2 - Design Reviews | | | | | | c | s | s |
| 103.3 - Program Reviews | | | | | | c | s | s |
| 103.4 - LSA Review | s | s | s | s | s | s | c | s |
| 200 - MISSION & SUPPORT SYSTEMS DEFINITION | | | | | | | | |
| 201 - Use Study | | | | | | | | |
| 201.1 - Supportability Factors | | | | | | | i | x |
| 201.2 - Quantitative Factors | | | | | | | i | x |
| 201.3 - Field Visits | s | s | s | | | | s | x |
| 201.4 - Use Study Report and Updates | | | | | | a | r | x |
| 202 - Mission Hardware, Software, and Support System Standardization | | | | | | | | |
| 202.1 - Supportability Constraints | | | | | | | s | x |
| 202.2 - Supportability Characteristics | | | | | | | s | x |
| 202.3 - Recommended Approaches | | | | | | a | r | x |
| 202.4 - Risks | | | | | | | r | x |
| 203 - Comparative Analysis | | | | | | | | |
| 203.1 - Identify Comparative Systems | | | | | | | | |
| 203.2 - Baseline Comparative System | | | | | | a | r | x |
| 203.3 - Comparative System Characteristics | | | | | | | | |
| 203.4 - Qualitative Supportability Problems | | | | | | a | r | x |
| 203.5 - Supportability Cost and Readiness Driver | | | | | | a | r | x |
| 203.6 - Unique System Drivers | | | | | | | | |
| 203.7 - Updates | | | | | | a | r | x |
| 203.8 - Risks and Assumptions | | | | | | a | r | x |
| 204 - Technological Opportunities | | | | | | | | |
| 204.1 - Recommended Design Objectives | | | | | | a | r | x |
| 204.2 - Updates | | | | | | a | r | x |
| 204.3 - Risks | | | | | | a | r | x |
| 205 - Supportability & Supportability Related Design Factors | | | | | | | | |
| 205.1 - Supportability Characteristics | | | | | | | | |
| 205.2 - Supportability Objectives & Associated Risks | | | | | | | | |
| 205.3 - Specification Requirements | | | | | | a | r | x |
| 205.4 - NATO Constraints | | | | | | | | |
| 205.5 - Supportability Goals & Thresholds | | | | | | | | |

FIGURE C-15. DETAILED LSA ORGANIZATIONAL ENVIRONMENT - FULL SCALE DEV PHASE

| | HQ USAF | HQ AFSC | USING CMD | AFLC ALCs | AFOTEC | ATC | PM | SPO DPML | CONTR |
|---|---|---|---|---|---|---|---|---|---|
| **300 - PREPARATION AND EVALUATION OF ALTERNATIVES** | | | | | | | | | |
| 301 - Functional Requirements Identification | | | | | | | | | |
| 301.1 - Functional Requirements | | s | s | s | | | a | i | x |
| 301.2 - Unique Functional Requirements | | s | s | s | | | a | i | x |
| 301.3 - Risks | | s | s | s | | | a | i | x |
| 301.4 - Operations and Maintenance Tasks | | s | s | s | | | a | i | x |
| 301.5 - Design Alternatives | | s | s | s | | | a | i | x |
| 301.6 - Updates | | s | s | s | | | a | i | x |
| 302 - Support System Alternatives | | | | | | | | | |
| 302.1 - Alternative Support Concepts | | | | | | | | | |
| 302.2 - Support Concept Updates | | | | | | | a | s | x |
| 302.3 - Alternative Support Plans | | | | | | | a | s | x |
| 302.4 - Support Plan Updates | | | | | | | a | s | x |
| 302.5 - Risks | | | | | | | a | s | x |
| 303 - Evaluation of Alternatives and Tradeoff Analysis | | | | | | | | | |
| 303.1 - Tradeoff Criteria | | | | | | | | i | x |
| 303.2 - Support Systems Tradeoffs | | | | | | | | s | x |
| 303.3 - System Tradeoffs | | | | | | | r | s | x |
| 303.4 - Readiness Sensitivities | | | | | | | | | |
| 303.5 - Manpower and Personnel Tradeoffs | | | | | | | r | r | x |
| 303.6 - Training Tradeoffs | | | | | | s | r | r | x |
| 303.7 - Repair Level Analyses | | | | s | | | r | r | x |
| 303.8 - Diagnostic Tradeoffs | | | | | | | | | |
| 303.9 - Comparative Evaluations | | | | | | | r | s | x |
| 303.10 - Energy Tradeoffs | | | | | | | r | s | x |
| 303.11 - Survivability Tradeoffs | | | | | | | r | s | x |
| 303.12 - Transportability Tradeoffs | | | | | | | | | |
| **400 - DETERMINATION OF LOGISTIC SUPPORT RESOURCE REQUIREMENTS** | | | | | | | | | |
| 401 - Task Analysis | | | | | | | | | |
| 401.1 - Task Analysis | | | | | | | r | s | x |
| 401.2 - Analysis Documentation | | | | | | | a | r | x |
| 401.3 - New/Critical Support Resources | | | | | | | a | r | x |
| 401.4 - Training Requirements & Recommendations | | | | | | s | r | r | x |
| 401.5 - Design Improvements | | | | | | | a | r | x |
| 401.6 - Manangement Plans | | | | | | | a | r | x |
| 401.7 - Transportability Analysis | | | | s | | | r | s | x |
| 401.8 - Provisioning Requirements | | | | s | | | r | s | x |
| 401.9 - Validation | | s | s | s | s | s | a | r | x |
| 401.10 - ILS Output Products | | | | s | | | a | r | x |
| 401.11 - LSAR Updates | | | | s | | | a | r | x |
| 402 - Early Fielding Analysis | | | | | | | | | |
| 402.1 - New System Impact | | | | | | | a | r | x |
| 402.2 - Sources of Manpower & Personnel Skills | | s | s | s | | s | a | r | x |
| 402.3 - Impact on Resource Shortfalls | | s | s | s | | | a | r | x |
| 402.4 - Combat Resource Requirements | | s | s | s | | | a | r | x |
| 402.5 - Plans for Problem Resolution | | s | s | s | | | a | r | x |
| 403 - Post Production Support Analysis | | | | | | | | | |
| 403.1 - Post Production Support Plan | | | | | | | | | |

FIGURE C-15. DETAILED LSA ORGANIZATIONAL ENVIRONMENT - FULL SCALE DEV PHASE

| | HQ USAF | HQ AFSC | USING CMD | AFLC ALCs | AFOTEC | ATC | PM | SPO DPML | CONTR |
|---|---|---|---|---|---|---|---|---|---|
| 500 - SUPPORTABILITY ASSESSMENT | | | | | | | | | |
| 501 - Supportability, Test, Evaluation, and Verification | | | | | | | | | |
| 501.1 - Test and Evaluation Strategy | | | | | s | | a | s | x |
| 501.2 - Objectives and Criteria | | | | | s | | a | s | x |
| 501.3 - Updates and Criteria | | | | | | | a | r | x |
| 501.4 - Supportability Assessment Plan (Post Deployment) | | | | | | | a | r | x |
| 501.5 - Supportability Assessment (Post Deployment) | | | | | | | | | |

```
LEGEND
x  Perform Task
*  Perform for Design Changes only
i  Input Task
s  Support Task and/or Review
c  Conduct Review
a  Approve Output
r  Review Output
```

FIGURE C-15. DETAILED LSA ORGANIZATIONAL ENVIRONMENT - FULL SCALE DEV PHASE

*LSA TASKS*

During PROD, the contractor analyzes future supportability of the system/equipment with support from HQ/AFSC, the ALC, and the Using Command. The task is reviewed by the DPML and approved by the PM. In addition, the following tasks are performed for design changes only:

202  Mission Hardware, Software, and Support System Standardization

301  Functional Requirements Identification

302  Support System Alternatives

303  Evaluation of Alternatives and Tradeoff Analysis

401  Task Analysis

402  Early Fielding Analysis.

LSA Task 501, Supportability, Test, Evaluation, and Verification is performed selectively. Design changes should be reviewed by LSA personnel for the effect they will have on the operational system and support systems. The LSAR is updated to reflect the design changes and T&E results.

| | HQ AFSC | USING CMD | AFLC ALCs | AFOTEC | ATC | PM | SPO DPML | CONTR |
|---|---|---|---|---|---|---|---|---|
| **100 - PROGRAM PLANNING & CONTROL** | | | | | | | | |
| 101 - Development of Early Logistics Support Strategy | | | | | | | | |
| 101.1 - LSA Strategy | | | | | | | | |
| 101.2 - Updates | | | | | | | | |
| 102 - Logistics Support Analysis Plan | | | | | | | | |
| 102.1 - LSA Plan | | | | | | | | |
| 102.2 - Updates | | | | | | | | |
| 103 - Program and Design Reviews | | | | | | | | |
| 103.1 - Establish Review Procedures | | | | | | x | s | s |
| 103.2 - Design Reviews | | | | | | c | s | s |
| 103.3 - Program Reviews | | | | | | c | s | s |
| 103.4 - LSA Review | s | s | s | s | s | s | c | s |
| **200 - MISSION & SUPPORT SYSTEMS DEFINITION** | | | | | | | | |
| 201 - Use Study | | | | | | | | |
| 201.1 - Supportability Factors | | | | | | | | |
| 201.2 - Quantitative Factors | | | | | | | | |
| 201.3 - Field Visits | | | | | | | | |
| 201.4 - Use Study Report and Updates | | | | | | | | |
| 202 - Mission Hardware, Software, and Support System Standardization | | | | | | | | |
| 202.1 - Supportability Constraints | | | | | | | s | • |
| 202.2 - Supportability Characteristics | | | | | | | s | • |
| 202.3 - Recommended Approaches | | | | | | a | r | • |
| 202.4 - Risks | | | | | | | r | • |
| 203 - Comparative Analysis | | | | | | | | |
| 203.1 - Identify Comparative Systems | | | | | | | | |
| 203.2 - Baseline Comparative System | | | | | | | | |
| 203.3 - Comparative System Characteristics | | | | | | | | |
| 203.4 - Qualitative Supportability Problems | | | | | | | | |
| 203.5 - Supportability Cost and Readiness Driver | | | | | | | | |
| 203.6 - Unique System Drivers | | | | | | | | |
| 203.7 - Updates | | | | | | | | |
| 203.8 - Risks and Assumptions | | | | | | | | |
| 204 - Technological Opportunities | | | | | | | | |
| 204.1 - Recommended Design Objectives | | | | | | | | |
| 204.2 - Updates | | | | | | | | |
| 204.3 - Risks | | | | | | | | |
| 205 - Supportability & Supportability Related Design Factors | | | | | | | | |
| 205.1 - Supportability Characteristics | | | | | | | | |
| 205.2 - Supportability Objectives & Associated Risks | | | | | | | | |
| 205.3 - Specification Requirements | | | | | | a | r | x |
| 205.4 - NATO Constraints | | | | | | | | |
| 205.5 - Supportability Goals & Thresholds | | | | | | | | |

FIGURE C-16. DETAILED LSA ORGANIZATIONAL ENVIRONMENT -- PROD/DEPLOY PHASE

| | HQ AFSC | USING CMD | AFLC ALCs | AFOTEC | ATC | PM | SPO DPML | CONTR |
|---|---|---|---|---|---|---|---|---|
| **300 – PREPARATION AND EVALUATION OF ALTERNATIVES** | | | | | | | | |
| 301 – Functional Requirements Identification | | | | | | | | |
| 301.1 – Functional Requirements | s | s | s | | | a | i | • |
| 301.2 – Unique Functional Requirements | s | s | s | | | a | i | • |
| 301.3 – Risks | s | s | s | | | a | i | • |
| 301.4 – Operations and Maintenance Tasks | s | s | s | | | a | i | • |
| 301.5 – Design Alternatives | s | s | c | | | a | i | • |
| 301.6 – Updates | s | s | s | | | a | i | • |
| **302 – Support System Alternatives** | | | | | | | | |
| 302.1 – Alternative Support Concepts | | | | | | | | |
| 302.2 – Support Concept Updates | | | | | | | | |
| 302.3 – Alternative Support Plans | | | | | | a | s | . • |
| 302.4 – Support Plan Updates | | | | | | a | s | • |
| 302.5 – Risks | | | | | | a | s | • |
| **303 – Evaluation of Alternatives and Tradeoff Analysis** | | | | | | | | |
| 303.1 – Tradeoff Criteria | | | | | | | i | • |
| 303.2 – Support Systems Tradeoffs | | | | | | | s | • |
| 303.3 – System Tradeoffs | | | | | | | | |
| 303.4 – Readiness Sensitivities | | | | | | | | |
| 303.5 – Manpower and Personnel Tradeoffs | | | | | | | | |
| 303.6 – Training Tradeoffs | | | | | s | r | r | • |
| 303.7 – Repair Level Analyses | | | s | | | r | r | • |
| 303.8 – Diagnostic Tradeoffs | | | | | | | | |
| 303.9 – Comparative Evaluations | | | | | | r | s | • |
| 303.10 – Energy Tradeoffs | | | | | | r | s | • |
| 303.11 – Survivability Tradeoffs | | | | | | r | s | • |
| 303.12 – Transportability Tradeoffs | | | | | | | | |
| **400 – DETERMINATION OF LOGISTIC SUPPORT RESOURCE REQUIREMENTS** | | | | | | | | |
| 401 – Task Analysis | | | | | | | | |
| 401.1 – Task Analysis | | | | | | a | r | • |
| 401.2 – Analysis Documentation | | | | | | a | r | • |
| 401.3 – New/Critical Support Resources | | | | | | a | r | • |
| 401.4 – Training Requirements & Recommendations | | | | | s | a | r | • |
| 401.5 – Design Improvements | | | | | | a | r | • |
| 401.6 – Management Plans | | | | | | a | r | • |
| 401.7 – Transportability Analysis | | | | s | | a | s | • |
| 401.8 – Provisioning Requirements | | | | s | | a | s | • |
| 401.9 – Validation | s | c | s | s | s | a | s | • |
| 401.10 – ILS Output Products | | | | s | | a | r | • |
| 401.11 – LSAR Updates | | | | s | | a | r | • |
| **402 – Early Fielding Analysis** | | | | | | | | |
| 402.1 – New System Impact | | | | | | a | r | • |
| 402.2 – Sources of Manpower & Personnel Skills | s | s | s | | s | a | r | • |
| 402.3 – Impact on Resource Shortfalls | s | s | s | | | a | r | • |
| 402.4 – Combat Resource Requirements | s | s | s | | | a | r | • |
| 402.5 – Plans for Problem Resolution | s | s | s | | s | a | r | • |
| **403 – Post Production Support Analysis** | | | | | | | | |
| 403.1 – Post Production Support Plan | s | s | s | | | a | r | x |

FIGURE C-16. DETAILED LSA ORGANIZATIONAL ENVIRONMENT -- PROD/DEPLOY PHASE

| | HQ AFSC | USER CMD | AFLC ALCs | AFOTEC | TRNG CMD | PM | SPO DPML | CONTR |
|---|---|---|---|---|---|---|---|---|
| 500 – SUPPORTABILITY ASSESSMENT | | | | | | | | |
| 501 – Supportability, Test, Evaluation, and Verification | | | | | | | | |
| 501.1 – Test and Evaluation Strategy | | | | | | | | |
| 501.2 – Objectives and Criteria | | | | | | | | |
| 501.3 – Updates and Criteria | | s | s | s | | a | r | x |
| 501.4 – Supportability Assessment Plan (Post Deployment) | | s | s | s | | a | r | x |
| 501.5 – Supportability Assessment (Post Deployment) | | s | s | s | | a | r | x |

```
LEGEND
 x  Perform Task
 *  Perform for Design Changes Only
 i  Input Task
 s  Support Task and/or Review
 c  Conduct Review
 a  Approve Output
 r  Review Output
```

FIGURE C-16. DETAILED LSA ORGANIZATIONAL ENVIRONMENT -- PROD/DEPLOY PHASE

## C.4 SUMMARY

The major responsibilities undertaken by Air Force organizations for ensuring an effective application of the LSA process are as follows:

- Specifying weapon system requirements;

- Determining the extent to which LSA will be performed;

- Guiding and supervising the implementation of LSA;

- Testing and validating LSA results; and

- Incorporating any changes to the design of the weapon system indicated by LSA.

All LSA activities take place under the overall management of the SPO. The SPO is the AFSC agency responsible for weapon system support planning and plays a major role in planning, developing, managing, monitoring, supervising, and reviewing all phases of LSA.

> *SPO.* All LSA activities take place under the overall management of the SPO. The SPO is the AFSC agency responsible for weapon system support planning

and plays a major role in planning, developing, managing, monitoring, supervising, and reviewing all phases of LSA.

*AFSC.* AFSC assigns the responsibility and authority for an acquisition to a PM who has overall management authority for the SPO; including responsibility for implementing LSA. The PM not only oversees and manages but takes the lead in giving form and direction to LSA for a particular acquisition. Embedded in this overall responsibility are two major tasks: tailoring LSA to meet the specific needs of a particular acquisition; and approving critical milestones in the LSA process by signing off on many of the tasks and subtasks. The PM is supported in this effort by the DPML or the ILSM.

*DPML* The DPML is responsible for supporting the implementation of the LSA tasks and for reviewing the output. The extent to which the DPML is involved in the specific tasks associated with LSA activities varies depending on the Using Command, the Product Division, and the type of acquisition. For example, many ESD acquisitions involve commercial off-the-shelf products for which the need for LSA is minimal. On the other hand, for a major weapon system acquisition such as the C-17, the LSA process is a major undertaking. In addition to overseeing very specific LSA tasks, the DPML participates in the initial LSA guidance conferences which provide a forum for the DPML to direct the Contractor's role in performing LSA. These conferences are used to establish LSA procedures for a particular acquisition, and to develop a common understanding of those procedures between Air Force and Contractor personnel.

*AFLC.* AFLC implements LSA policy and procedures in conjunction with AFSC, and appoints an SPM who is responsible for ensuring that LSA is applied to all acquisitions and major modifications, and for providing AFLC support to the SPO. Within AFLC, the ALCs and the AFALC both provide logistics support responsibilities during the weapon system acquisition.

*ALC.* The ALCs support the PM and the DPML (or ILSM) in the development, implementation, and management of an effective LSA program. The ALC is primarily concerned with weapon system operations and their role in the LSA process is limited to technical input to the initial guidance process and the LSAR reviews. They also assist the SPO in SMR coding, SE, and provisioning.

*AFALC.* AFALC often provides the LSA performing organizations with the required trained personnel to execute the tasks associated with LSA. For example, all the DPMLs are assigned to SPOs from AFALC.

*Other Organizations.* ATC, AFOTEC, and the Air Force Plant Representative Office (AFPRO) have important, but less central roles in LSA. The Using Command is extensively involved in supporting LSA. In many acquisitions,

this can mean an extensive commitment of resources. The Using Command supplies the mission and functional requirements of the weapon system and skilled operational personnel to support the SPO.

*Contractor.* The Contractor has a central responsibility for performing all the analytic work required by LSA, for recording the results of these analyses, for producing reports based on these results, and for delivering these reports to the Air Force. The Contractor participates in the development of LSA procedures through the guidance conferences and also plays a central role in LSAR reviews. During these reviews, which are usually held at the Contractor's facility, the Contractor must be prepared to defend the results of the LSA tasks, to explain any discrepancies which have been identified in a preliminary review by the Air Force, and to supply any supporting information, such as engineering drawings, that may be required to clarify issues.

*REFERENCES*

# REFERENCES

*MILITARY STANDARDS*

MIL-STD-470        Maintainability Program Requirements.

MIL-STD-471        Maintainability Verification/Demonstration/Evaluation.

MIL-STD-490        Specification Practices.

MIL-STD-499        Engineering Management.

MIL-STD-680        Contractor Standardization Plans and Management.

MIL-STD-785        Reliability Program for Systems and Equipment Development and Production.

MIL-STD-881        Work Breakdown Structure for Defense Material Items.

MIL-STD-882        System Safety Program for Systems and Associated Subsystems and Equipment; Requirements for

MIL-STD-965        Parts Control Program.

MIL-STD-1367       Packaging, Handling, Storage, and Transportability Program Requirements (for Systems and Equipments).

MIL-STD-1388-1A Logistics Support Analysis.

MIL-STD-1388-2A DoD Requirements for a Logistics Support Analysis Record.

MIL-STD-1390       Level of Repair.

MIL-STD-1521       Technical Review and Audits for System, Equipment, and Computer Software.

MIL-STD-1561       Provisioning Procedures, Uniform DoD.

MIL-STD-1629       Procedures for Performing a Failure Mode, Effects, and Criticality Analysis.

MIL-STD-2073       DoD Materiel, Procedures for Development and Application of Packaging Requirements.

MIL-STD-2073-1  DoD Packaging Data Forms Instruction for Preparation and Use.

*DATA ITEM DESCRIPTIONS*

DI-A-7088          Conference Agenda.

DI-A-7089           Conference Minutes.

DI-E-7026           Parts Control Program Plan.

DI-E-7027           Program Parts Selection Lists (PPSL).

DI-E-7028           Nonstandard Parts Approval Requests/Proposed Additions to an
                    Approved PPSL.

DI-E-7029           Military Detail Specifications and Specification Sheets.

DI-E-7030           Test Data for Nonstandard Parts.

DI-S-7017A          Logistics Support Analysis Plan.

DI-L-7114           Logistics Support Analysis Strategy Report.

DI-L-7121           Supportability Assessment Report.

DI-L-7145           Logistics Support Analysis Record (LSAR) Data.

DI-L-7159           Task Narrative Master File.

DI-L-7180           Logistics Support Analysis Control Number Master File.

DI-L-7181           Parts Master File.

DI-L-10827          Integrated Support Plan.

DI-P-7119           Post Production Support Plan.

DI-S-3606           System/Design Track Study Report.

DI-S-4057           Scientific and Technical Reports.

DI-S-7115           Use Study Report.

DI-S-7116           Comparative Analysis Report.

DI-S-7117           Technological Opportunities Report.

DI-S-7118           Early Fielding Analysis Report.

DI-S-7120           Supportability Assessment Plan.

*REGULATIONS*

AFLCR/AFSCR
800-36              Logistics Support Analysis.

AFLC 23-17        Air Force Acquisition Logistics Center.

AFLC 23-31        Commander, Air Logistics Centers.

AFLC 23-42        Directorate of Maintenance, Air Logistics Centers.

AFLC 23-43        Directorate of Material Management.

AFLC 23-39        Directorate of Competition Advocacy.

AFR 50-8          Policy and Guidance for Instructional System Development.

AFR 57-1          Operational Needs.

AFR 57-4          Modification Approval and Management.

AFR 65-110        Production Management Branch.

AFR 800-xx        Acquisition Management – Logistics Support Analysis

AFR 800-2         Acquisition Program Management.

AFR 800-8         Integrated Logistics Support (ILS) Program.

AFR 800-11        Life Cycle Cost Management Program.

AFR 800-12        Acquisition of Support Equipment.

AFR 800-14        Test and Evaluation.

AFR 800-18        Air Force Reliability and Maintainability Program.

AFR 800-34        Engineering Data Acquisition.

AFR 800-36        Provisioning of Spares and Repair Parts.

MAC REG 23-2      Organization and Functions HQ, Military Airlift Comand.

## DIRECTIVES

DoDD 3-M-1        Test and Evaluation Master Plan (TEMP) Guidelines.

DoDD 39           Acquisition and Management of Integrated Logistics Support for Systems and Equipment.

DoDD 4120.3       Defense Standardization and Specification Program.

DoDD 5000.2       Major System Acquisition Procedures.

## HANDBOOKS AND OTHER DOCUMENTS

Air Force Magazine, May 1987.

AFLC Action Officers Guidebook. Introduction to the Air Force Logistics Command: Lifeline of the Aerospace Team.

AFLCP/AFSCP
800-34          Acquisition Logistics Management.

MIL-HDBK-472    USAF Reliability and Maintainability Action Plan, R&M 2000.

Gane, C. and Sarson, T. "Structured Systems Analysis: Tools and Techniques", McDonnel-Douglas Corporation, 1982.

McCarty, D. and Bayles, R. "View from the DPML: Performance and Supportability:, 1987.

CM 110231100   Integrated Computer-Aided Manufacturing (ICAM) Function
               Modeling Manual (IDEF$_0$) – Softech, Inc., Waltham MA.

## PRINCIPAL POINTS OF CONTACT

Principal points of contact for the LSA process are listed in Figure R-1.

**AFLC**

| HQ | AFALC | LMSC | SM/ALC | WR/ALC | LOC |
|---|---|---|---|---|---|
| MMAT | ERR | SQP | MMT | MMAMA | AT |
| MMTIB | ERT | SMO | CR | | |
| XRIC | LSE | SMIR | CREEB | | |
| | LSG | SHO | MAQ | | |
| | OAJB | SMW | MMMP | | |
| | ERL | SMA | MAW | | |
| | ER | SBP | MAWS | | |
| | | SMIE | MAN | | |
| | | SHT | MME | | |
| | | SMIA | MMED | | |
| | | | MMEDS | | |

**AFSC**

| ASD | ESD | BMC | HQ |
|---|---|---|---|
| ALH | JSL | ALT | PLLP |
| YXYL | JSTML | | PLXC |
| ALT | PLLM | | |
| YCL | | | |
| ENE | | | |
| B1LRE | | | |

| TAC | MAC | AFSPACECOM | USAF | DoD | USAMC |
|---|---|---|---|---|---|
| HQ | HQ | HQ | HQ | WSIAO | MRSA |
| SMO-J | LG | LKYY | LEYM | | |
| TACLLD | LGXA | | | | |
| | LGMM | | | | |
| | LGXAS | | | | |
| | LGMMC | | | | |
| | XPQC | | | | |

**CONTRACTORS:**

| | | |
|---|---|---|
| MARTIN-MARIETTA | ROCKWELL | McDONNELL DOUGLAS | NORTHROP |
| GRUMMAN | LOCKHEED | SIMMONS | ERC |

FIGURE R-1.  LSA CONTACTS